OCT 29 1992

I 29.79/5:C 97/938-88

NATIONAL PARK SERVICE
OLYMPIC NATIONAL PARK

DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED CUSHMAN AREA LAND EXCHANGE AND BOUNDARY CHANGE

1992

DRAFT ENVIRONMENTAL ASSESSMENT
FOR THE
PROPOSED CUSHMAN AREA LAND EXCHANGE
AND BOUNDARY CHANGE

DRAFT ENVIRONMENTAL ASSESSMENT OF THE PROPOSED CUSHMAN AREA LAND EXCHANGE AND BOUNDARY CHANGE: A Proposed Federal Action To Resolve The Issue Of Encroachment By The Cushman Hydroelectric Project (FERC #460) On Olympic National Park

1.0 Table of Contents i
1.1 Illustrations ii
2.0 Summary 1
3.0 Introduction 1
  3.1 Overview of NEPA Process 1
  3.2 Authority for the Proposed Action 2
4.0 Purpose and Need for Action 5
  4.1 History of the Issue 5
  4.2 Scope of the Issue 6
5.0 Background Information 11
  5.1 Agency Mandates and Policies 12
6.0 Past and current studies of the Issue 13
7.0 Alternatives 14
  7.1 Proposed Action 14
  7.2 No Action (status quo) 14
  7.3 Others 15
8.0 Affected Environment 15
  8.1 Management Agreement with TPU 15
  8.2 NPS lands proposed to be deleted from ONP 15
  8.3 Two tracts bisected by Soleduck Valley Road 19
  8.4 Quileute Valley Tract 19
9.0 Environmental Consequences of Alternatives 22
  9.1 Preferred Alternative (proposed action) 22
  9.2 No Action (status quo) 24
  9.3 725 foot elevation 24
10.0 List of Reviewers 25
11.0 Consultation/Coordination During Preparation 25
  11.1 Comments for Skokomish Tribe 26
  11.2 Comment: Twanoh Group/Sierra Club 31
  11.3 Letter/Olympic Park Associates 32
  11.4 Letters/Comments Sheets from Public 32
12.0 Appendices 33
  A: Letters/filings from USDI Secretary, Office of the Solicitor, to FERC. 34
  B: Raedeke Associate Report 44
  C: Letters/memos Reporting Results of Northern Spotted Owl Surveys 87
  D: Study of Hydrology of Park Lands Near Cushman Reservoir 91
  E: Summary Report of Cultural Resource Surveys of Land Proposed for Deletion from ONP in vicinity of Cushman Reservoir 135
  F: Scoping Process: Final Report 140
  G: North Fork Skokomish River - Fish Surveys 163

Illustrations

Illustration #1 7
ONP Cushman Land Exchange Proposal (Affected Areas)

Illustration #2 8
North Fork Skokomish River: ONP Boundary

Illustration #3 9
Soleduck Valley Road: ONP Boundary

Illustration #4 10
Quilcene/La Push Road: ONP & Wilderness Boundary

Illustration #5 16
Proposed Boundary Revision Between ONP and TPU

Illustration #6 21
Map, showing location of Reed Canarygrass
(*P. arundinacea*) in vicinity of park boundary
at Cushman Reservoir.

2.0 SUMMARY

A federal action is proposed, which would involve a land exchange with Tacoma Public Utilities and a Congressional authorized boundary change, deleting lands affected by the Cushman Hydroelectric Project from Olympic National Park. This document presents alternatives and discusses a range of environmental concerns.

The proposed action involves 45 acres of land in two parcels, currently owned by the State of Washington (Department of Natural Resources) and located within the authorized boundary of Olympic National Park. These lands would be acquired by Tacoma Public Utilities for the sole purpose of exchange with the Park for approximately 30 acres at the head of Cushman Reservoir that are partially inundated when the reservoir is at full basin, or elevation 738 feet, Cushman Datum (C.D.).

Anticipating that information about affected natural and cultural resource values would be needed to assess environmental effects, the Park and Tacoma Public Utilities cooperated in studies to obtain information about several key issues. These reports are presented in the appendices, and the information is discussed in the text.

A public scoping of issues and concerns was conducted. A summary is presented in the text with responses, and reports are appended.

3.0 INTRODUCTION

3.1 Overview of NEPA Process

The National Environmental Policy Act (NEPA) requires review of any proposed federal action that will have significant effect(s) on natural or cultural resources. While the Act has provision for categorical exclusions, this proposed action is not so excluded. The Secretary does not have authority to adjust significantly the boundary of a national park. Congress has retained that authority. In addition the proposed action is connected to the larger FERC licensing process, and may involve consideration of cumulative effects of other actions. "Connected-ness" among NEPA compliance issues refers to relationships in timeliness (process) and content (product). The National Park Service recognizes that several resource concerns addressed in this document are connected to the Project licensing, and will not be fully addressed until FERC prepares its NEPA compliance document.

There has been significant public controversy over this issue. Federal Agencies and the Skokomish Indian Tribe have objected to the proposed action, arguing that the negotiation should not proceed before or apart from the larger licensing NEPA compliance process. Conversely, several hundred lessees in the Cushman Project area have urged the Olympic National Park Superintendent to accept the Project at full basin, or 738 feet (Cushman Datum), as the effects on property values, public safety, and recreational values will be significant. Olympic National Park has prepared this Draft Environmental Assessment (DEA) in compliance with NEPA. Following public and agency review and comment on the DEA, the Park Superintendent will make a Record of Decision. That decision will be either:

...to make a Finding of No Significant Impact (FONSI) and proceed with the proposed action

...to defer a decision until FERC completes an environmental review of the licensing of the Cushman #460 Project

... to cause to be prepared an Environmental Impact Statement (EIS) of the issue and proposed action.

3.2 Authority for the Proposed Action

The word "Authorities" as used refers to directives of law, such as Acts of Congress and Executive Orders that pertain in the circumstance. The principal authorities are:

the National Park Service Organic Act of 1916 (PL Chapter 408, 39 Stat. 535 et seq., 16 USC 1); (see Section 5.1, Agency Mandates)

the Act Establishing Olympic National Park, 1938; (see Section 5.1, Agency Mandates)

the National Environmental Policy Act of 1969 (NEPA) (PL 91-190, 42 USC 4321 et seq., 83 Stat. 852, 42 USC 4332, as amended): NEPA is the basic national charter for environmental protection. The Act declares that it is the policy of the federal government to "...preserve important historic, cultural, and natural aspects of our national heritage". Title I of NEPA requires that federal agencies plan and carry out their activities "...so as to protect and enhance the quality of the environment". To enact this policy, NEPA requires an interdisciplinary study of the impacts associated with federal programs. (NPS 77. Appendix A, p.11)

the Endangered Species Act of 1973 (ESA) (PL 93-205, 87 Stat. 884, 7 USC 136, as amended): This Act requires federal agencies to ensure that their activities (authorized, funded,

or carried out) will not jeopardize existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. (NPS 77, Appendix A, p.4);

the Federal Water Pollution Control Act (Clean Water Act of 1972) (PL 92-500, PL 100-433, 86 Stat. 816, USC 9 sec. 1251 et seq., as amended, 33 USC sec. 1251-1376), and 1987 Federal Water Quality Act: The 1972 Act contains provisions designed "to restore and maintain the chemical, physical and biological integrity of the Nation's waters", and authorize a " National Wetlands Inventory". The 1987 Act places greater emphasis on toxicological-based criteria and in situ biological monitoring. (NPS 77, Appendix A, p 5.);

Executive Order 11988 "Floodplain Management"(1977). The objective of this Order is to avoid, to the extent possible, long- and short-term adverse impacts associated with the occupancy and modifications to floodplains, and to avoid direct and indirect support of floodplain development whenever there is a practicable alternative. (NPS 77 Appendix A, p 17);

Executive Order 11990 "Protection of Wetlands" [42 USC 4321 (1982)]; Section 4 specifies:

> **"When Federally-owned wetlands or portions of wetlands are proposed for lease, easement, right-of-way, or disposal to non-Federal public or private parties, the Federal agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State, or local wetlands regulations; and (b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor, except where prohibited by law; or, (c) withhold such properties from disposal."**

Further, the NPS Floodplain Management and Wetland Protection Guidelines require that the EA identify the full range of direct or indirect adverse impacts that the proposed action could have on the wetland resources (Section 6.D.4) (In this case, adverse impacts would be any direct or indirect loss or degradation of wetland resources that could result from future management of the wetland areas after the proposed land exchange.) (from comments by Mr. Joel Wagner, NPS Water Resources Div., 7/10/92);

The National Historic Preservation Act (NHPA): October 15, 1966, amended 1980 (P.L. 89-665; 810 Stat. 915; 16 USC 470 and amendments P.L. 91-243, P.L. 94-458, P.L. 94-422, P.L.96-515);

Section 106 of the NHPA states:

> The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under title II of this Act a reasonable opportunity to comment with regard to such undertaking.

The American Indian Religious Freedom Act (AIRFA): August 11, 1978 (P.L. 95-341; 92 Stat. 469; 42 USC 1996):

It shall be the policy of the United States to "protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites."

The Archeological Resources Protection Act (ARPA): October 31, 1979 (P.L. 96-95; 93 Stat. 712; 16 USC 470):

ARPA provides for the protection of archeological resources located on public lands and Indian lands; defined archeological resources to be any material remains of past human life or activities that are of archeological interest and are at least 100 years old; encouraged cooperation between groups and individuals in possession of archeological resources from public or Indian lands with special permit and disposition rules for the protection of archeological resources on Indian lands in light of the American Indian Religious Freedom Act; provided that information regarding the nature and location of archeological resources may remain confidential; and established penalties for unauthorized acts.

The Native American Graves Protection and Repatriation Act (NAGPRA): November 16,1990 (P.L. 101-601, 25 USC 3001, 104 Stat. 3048, H.R. 5237);

The purpose of H.R. 5237 is to protect Native American burial sites and human remains, funerary objects, sacred objects, and objects of cultural patrimony on federal, Indian, and Native Hawaiian lands. The Act also sets up a process by which federal agencies and museums receiving federal funds will inventory holdings of such remains and objects and work with appropriate

Indian tribes and Native Hawaiian organizations to reach agreement on repatriation or other disposition of these remains and objects.

4.0 PURPOSE AND NEED FOR ACTION

4.1 History of the Issue:

In 1974 an existing "Minor Part" license issued in 1924 from the Federal Power Commission to Tacoma Public Utilities (TPU) expired, and TPU applied to the FERC for a license. At that time, the USDI expressed interest in the process, concerning encroachment of the project upon Olympic National Park, recreational and other cultural impacts of the Cushman Project. (see Appendix A: Letter/filing from USDI Secretary, Office of the Solicitor, to FERC.) FERC acknowledged the boundary dispute, and directed TPU to resolve it pursuant to licensing. A survey was conducted by the Bureau of Land Management which resolved the boundary dispute, showing that TPU's Cushman Project encroaches on the Park.

In 1978 the United States Department of Interior intervened in the FERC licensing of the Cushman Hydropower Project #460. The Cushman Project inundates approximately 11 acres of Olympic National Park. The Secretary of the Interior denies that FERC has authority to license this project within the Park. The Secretary maintains also that the Project affects natural, recreational and other cultural resource values.

The Secretary intervened also in the interests of the Bureau of Indian Affairs (BIA), representing in trust the Skokomish Indian Tribe, whose treaty reserved rights include the right to continue traditional activities on the affected lands.

To participate in the licensing process and negotiate for mitigations would acknowledge FERC authority. Therefore, the National Park Service seeks to relieve the encroachment through a negotiated land exchange with Tacoma Public Utilities, and a boundary change that will delete the Project-affected lands from Olympic National Park.

In 1991 Olympic National Park and TPU reached conceptual agreement to exchange lands and change the park boundary. Tacoma agreed to acquire approximately 45 acres of Washington Department of Natural Resources (DNR) land within the Soleduck and Quileute areas of the Park ('inholdings'), and to exchange these former DNR lands for 30 acres of the park at the head of the Cushman Reservoir. This would create a new TPU 'inholding', which would be eliminated by changing the park boundary (thereby deleting the inholding from the park) and providing no contest to either authority, the Secretary of the Interior, or FERC, regarding licensing the Cushman Project. [Illustration #1 is a map of the Olympic National Park, showing the three areas involved in the proposed land exchange, in relation to watersheds and the park boundary. Illustrations #2, #3, and #4 are maps of each of the three areas.]

4.2 Scope of the Issue:

This proposed federal action is connected to the FERC licensing process in several ways: a jurisdictional dispute regarding FERC authority to license this Project within a National Park may not be avoided unless the encroachment situation is corrected; cultural values of the Skokomish Tribe include traditional and accustomed use of the lands proposed for exchange to TPU; Project impacts upon wildlife, recreation and other aesthetic values of the Park are identified and mitigations will be discussed conditional to licensing by FERC.

Earlier discussion of the encroachment issue and its resolution has shown that the issue is politically sensitive at the national level. Federal legislation is required, authorizing the Secretary of the Interior to change the park boundary.

The issue is controversial. Lands around the Cushman Reservoir have been leased and developed as retirement or vacation homes. The Washington Department of Recreation has established Cushman State Park on the shore. There is a concern that unless the encroachment is resolved and the project licensed, the impoundment may not be allowed to operate at "full basin", (738 feet elevation., C.D.) thereby adversely affecting property values, creating safety hazards, and leaving an aesthetically undesirable, exposed shore of mud, rocks and stumps. Adverse effects on wildlife have been observed and described by lakeshore property lessees.

Illustration #1

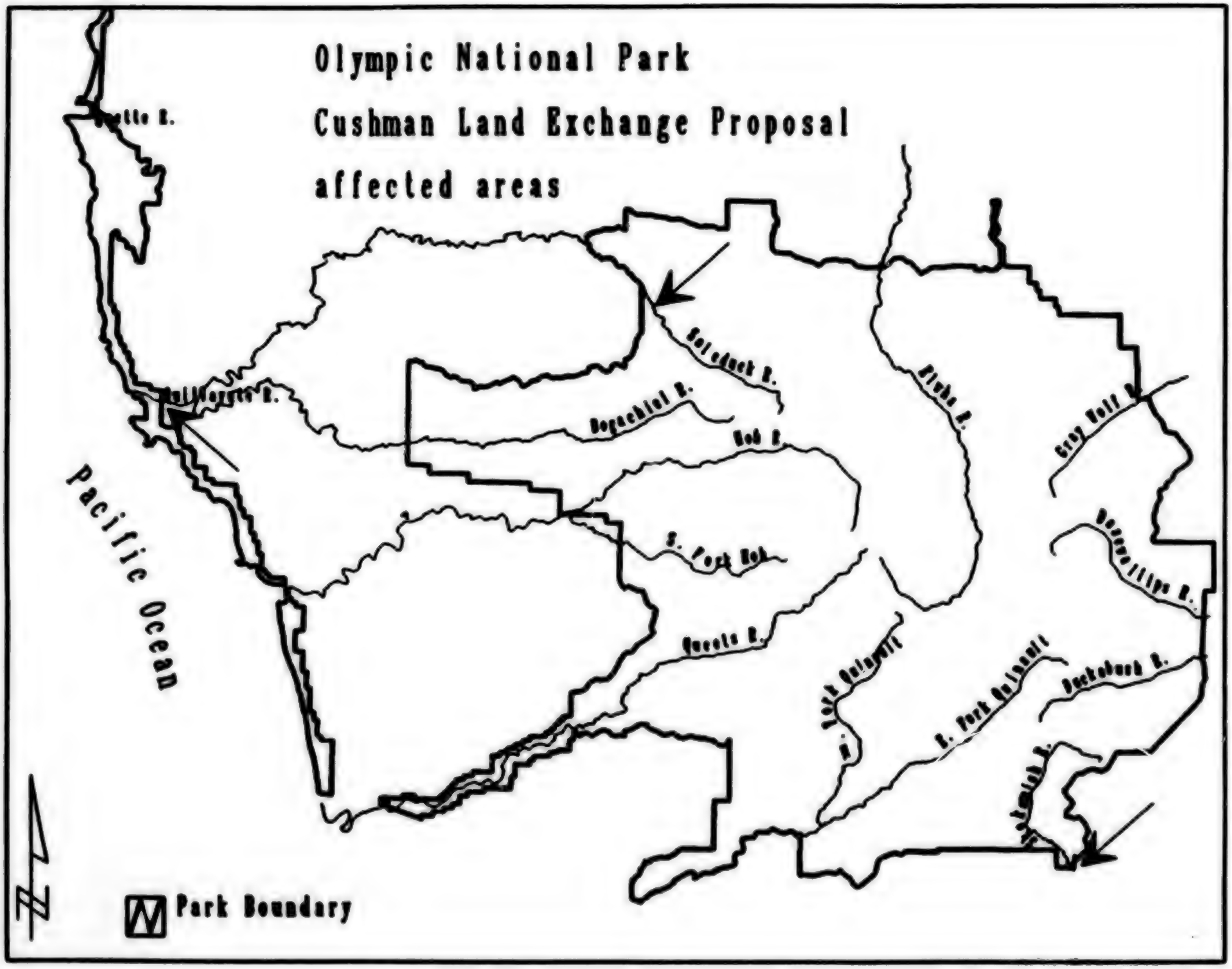


Illustration #2

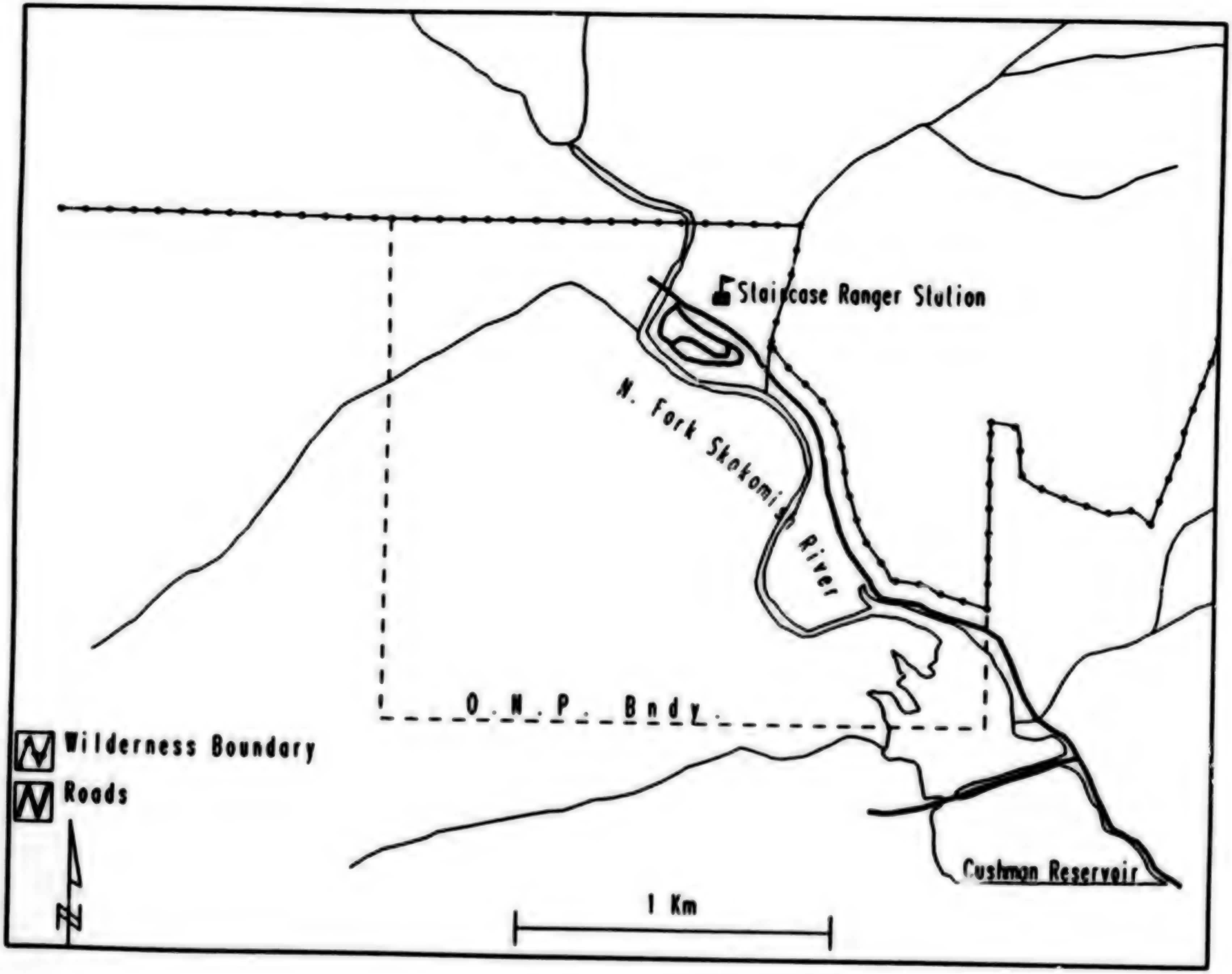


Illustration #3

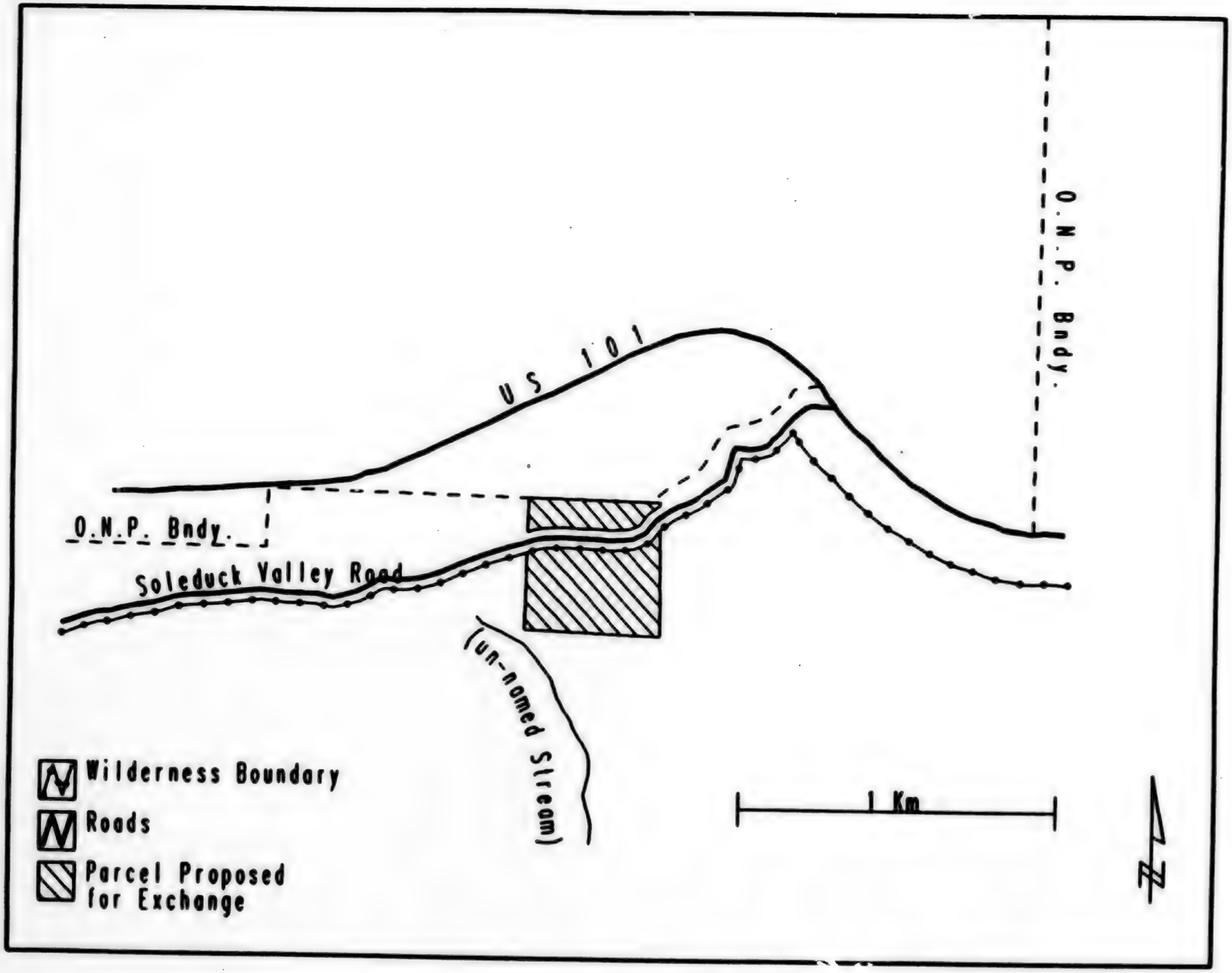
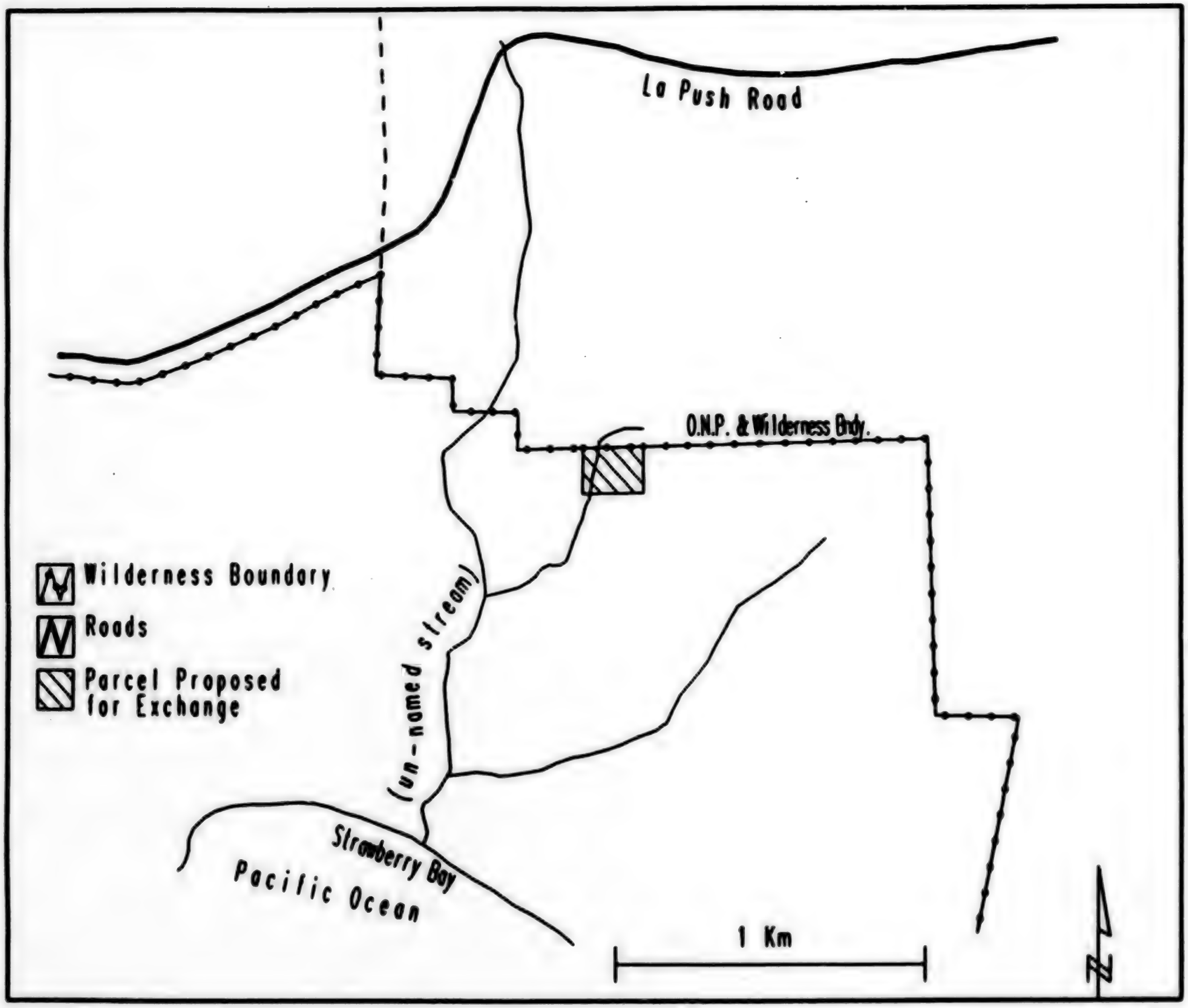


Illustration #4



The size of the area of park lands affected by the Project is not fixed and determined, due in part to the FERC requirement that the license application state the 742' level (for flood control purposes), while intending that 738' will be the maximum operational level. In addition, the alluvial lands where the river enters the Cushman Reservoir shift with seasonal flooding each spring. Therefore, while the actual inundation at 738' is 11 acres, more or less, and at 742' is 20 acres, the proposed action will delete about 30 acres from the Park, thereby establishing a boundary that will be relatively permanent and unaffected by project operations or shifting alluvium.

Controversy also exists over wildlife values, especially the effect on rare, threatened, or endangered, or other designated sensitive species of wildlife that use the Project-affected lands throughout the Skokomish valley, including the proposed exchange lands. These species identified, so far, are the Bald Eagle, Northern Spotted Owl, and the Bull Trout. The status of each of these species, as well as Roosevelt Elk, as far as known, is discussed.

Cultural resource issues and concerns have been raised by the Skokomish Tribe. These issues involve treaty-reserved rights and access to areas protected by federal law. Identification of these issues is a significant part of this document. Congress currently is considering legislation that would authorize or direct the Secretary of the Interior to effect a land exchange and boundary change. Congressional action is necessary, as the Secretary lacks the authority to act without it. Congress must consider the effects of its proposed legislation on the cultural values of the Skokomish Tribe.

The purpose of this document is to assess the issues and concerns of the public, government agencies, the Skokomish Tribe, and environmental and other organizations that may be affected by the proposed land exchange and boundary change, and so serve as a basis for a decision by the Park Superintendent.

All comments on the issue will be considered and evaluated in the decision-making process. No sooner than thirty days after completion and public release of this document, a record of decision will be announced by the Park Superintendent. That decision will be either to prepare an Environmental Impact Statement, or defer any action until completion of the FERC EIS, or to find that the proposed action has no significant impact, and to proceed with the land exchange and boundary change complementary to licensing of the project by FERC.

5.0 BACKGROUND INFORMATION

5.1 Agency Mandates and Policies

Agency mandates originate in law, and sometimes are clarified in Report language, documenting the legislative process. Relevant legislative Acts are cited elsewhere (Sec 3.2).

The National Park Service Organic Act of 1916 mandates preservation of natural resource values while providing for park visitor use and enjoyment of these resources. The National Park Service administers lands within the National Park System. There are several designations of management units within the NPS, of which "National Park" is one, and is the oldest type. National parks are established by Congress, and Congress has retained authority to add to or diminish national parks. The intent of the 1938 Act Establishing Olympic National Park is to authorize the park boundary, and identify the outstanding resources contained therein:

> ONP is located on the Olympic Peninsula in northwest Washington, west of the Puget Sound and the cities of Seattle and Tacoma. ONP was established by Congress to "...preserve for the benefit, use and enjoyment of the people, the finest sample of primeval forests of Sitka spruce, western hemlock, Douglas-fir, and western redcedar in the entire United States: to provide suitable winter range and permanent protection for the herds of native Roosevelt elk and other wildlife indigenous to the area; to conserve and render available to the people, for recreational use, this outstanding mountainous country, containing numerous glaciers and perpetual snowfields, and a portion of the surrounding verdant forests together with a narrow strip along the beautiful Washington coast."

The park was designated a Biosphere Reserve in 1976, and a World Heritage Site in 1981.

Natural Resource Management policies of the National Park Service are stated in NPS 77, "Natural Resources Management Guideline", which addresses federally-designated wilderness areas, as well as non-wilderness. The proposed action will add lands to the designated wilderness of ONP. The 30 acres proposed for deletion is not within the park's designated wilderness area. (See Illustration #2, p.8) Applicable policies regarding natural resources management may be summarized: wildlife populations and habitats are to be protected from man-caused change, while natural processes (i.e., bio/geo/chemical cycles) are allowed to occur without human disturbance.

Cultural Resource Management policies are in NPS 28, and in the 'Management Policies'(1988) of the NPS, which states:

> ...certain contemporary native American and other

> communities are permitted by law, regulation, or policy to pursue customary religious, subsistence, and other cultural uses of park resources with which they are traditionally associated. Such continuing use is often essential to the survival of family, community, or regional cultural systems, including patterns of belief and economic and religious life. Recognizing that its resource protection mandate affects this human use and cultural context of park resources, the National Park Service will plan and execute programs in ways that safeguard cultural and natural resources while reflecting informed concern for the contemporary peoples and cultures traditionally associated with them.

6.0 (PAST AND CURRENT STUDIES OF THE ISSUE)

Anticipating the need for resource information, the Park and TPU have caused several studies to be done:

- Raedeke Associates, Inc. "Assessment of Elk Habitat in the Olympic National Park Proposed Lake Cushman Land Exchange Area". Harza Northwest Inc., February 21, 1992. 21 pp, appendices. (Appendix B)

- Applied Geotechnology, Inc. "Groundwater-Surface Water Interaction Study Lake Cushman and North Fork Skokomish River Hoodsport, Washington". Harza Northwest Inc., January 7, 1992. 11 pp. tables, plates. (Appendix D)

- Spotted owl surveys. A letter from the US Forest Service, documenting relevant spotted owl survey data, is Appendix C.

- Fish Spawning Surveys. A report from Olympic National Park fishery biologist is Appendix G.

- Cultural Resource Surveys. A summary of this report, prepared by the NPS Pacific Northwest Region and Olympic National Park's Cultural Resources staff, is Appendix E.

Other studies done in the past have provided useful information, especially regarding the use of the affected lands by Roosevelt Elk. These are cited, where applicable, in the appended study reports.

An Environmental Assessment for a new license for the Cushman Project, FERC #460, was prepared by the Division of Hydropower Licensing, Office of Electric Power Regulation, FERC, on May 16, 1984. This document provides some general description of the environment of the Cushman Project, such as climatologic, hydrologic, geologic, and other natural resource and recreational information.

In 1988 FERC requested additional information from TPU pursuant to licensing. Much relevant information describing natural resources of the Skokomish valley is provided in a four volume response to FERC.

7.0 ALTERNATIVES

7.1 Proposed Action:

The proposed action consists of three elements, two of which are subject to the review provided by this document.

The first element is an Act of Congress (see discussion, Section 4.2), which will delegate authority from Congress to the Secretary of the Interior to change the Olympic Park Boundary and exchange the Project-affected park land at Cushman Reservoir for other lands of equal or greater value. This Congressional action is not the subject of this environmental review.

The second element is a land exchange between the National Park Service and Tacoma Public Utilities, by which action ONP will be diminished by 30 acres in the course of the boundary change. It is proposed that Tacoma will acquire title to two parcels comprised of three tracts, totaling approximately 45 acres, owned at present by the State of Washington, and managed by the Washington Department of Natural Resources. One parcel comprising 40 acres, more or less, contains two adjacent tracts in the Soleduck Valley area of ONP. The second parcel consists of 5 acres, more or less, in the Quileute Area of ONP. These Washington State lands are within the authorized boundary of ONP, and are the last Washington State land holdings in the park. The TPU would offer these 45 acres in trade to the park for the 30 acres at the head of Cushman Reservoir. Accepting the trade, the TPU would then hold title to the 30 acres at Cushman. This new TPU inholding would be deleted from the park by the boundary change.

The third element is action by the Secretary to change the park boundary, thereby deleting approximately thirty acres of land and water from the park and establishing a new boundary unaffected by the normal, anticipated operation of the project.

7.2 Continue Status Quo (litigation):

The "No Action" alternative would continue the status quo, would not relieve the potential for litigation between FERC and the United States Department of Interior. The U.S. Department of Justice may seek adjudication of the question of FERC's authority to license this project within the boundary of Olympic National Park. The NPS could file suit against TPU for trespass.

7.3 Other Alternatives

Congress could enact legislation, not to delegate authority, but to directly delete lands from the Olympic National Park. TPU could offer other lands than the described 45 acres in exchange to the park. The NPS could ask FERC to limit the surface elevation of the Cushman Project to a maximum of 725 feet, C.D., preventing the Cushman Project encroachment of the park.

8.0 AFFECTED ENVIRONMENT

8.1 Management Agreement with TPU

The lands to be deleted from ONP would be managed as if they remained part of the park, with wildlife habitat values recognized as most important. This 'condition' of agreement to trade the land to TPU is included in the draft legislative language currently in committee of Congress. Executive Order 11990, Protection of Wetlands, requires, in addition, that restrictions on the uses and management of wetlands on the property to leave the Park must be stipulated in the land exchange documents. Other 'conditions' or intentions of Congress for the continued use of the affected lands by the public and/or by the Skokomish tribe may be made known through the Report language, accompanying the legislation. Thus, through the Act and Report language, agreement between TPU and ONP to provide continued protection of natural resources, the Skokomish Tribes' reserved rights and other cultural values, and public recreation may be expressed, and will guide any action by the Secretary to consummate the proposed land exchange.

While negotiated 'agreement' is not intended to predetermine or restrict in any way TPU's operation of the Project, it will preclude leasing or development of the land for other purposes. It will also ensure that the lands will remain closed to all public hunting, while available for other recreation as it has been since the park was established.

8.2 The NPS lands proposed to be deleted from ONP are described on the map entitled, "Proposed Boundary Revision: ONP and TPU, 05/15/91, (Illustration #5, p.16).

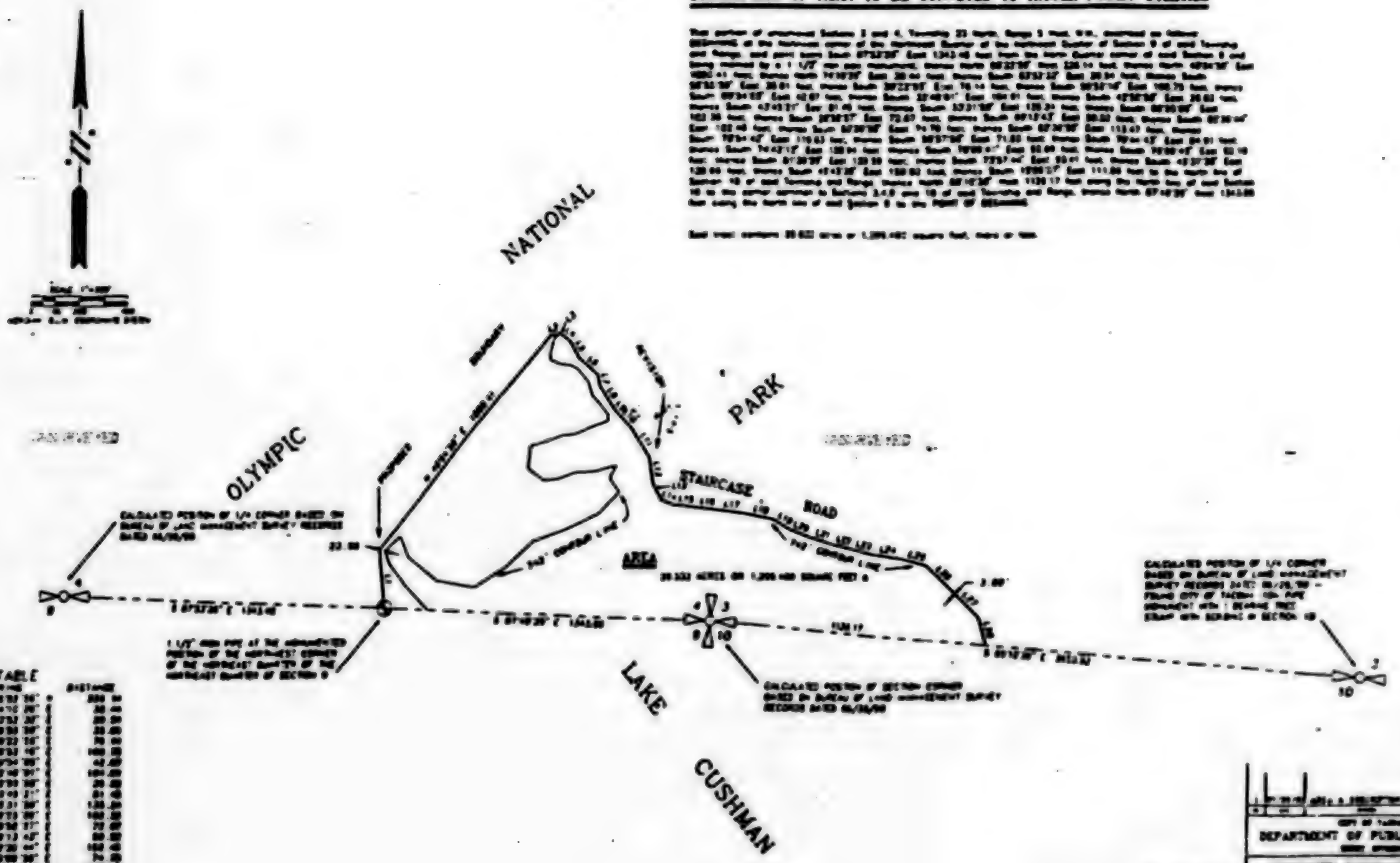
The approximately 30 acres at the head of Cushman Reservoir consists of water, bare sand and gravel, gravel sparsely vegetated with annual plants and other shrubs, and riparian woodlands of mixed deciduous trees and shrubs, with some conifer reproduction. While there are a few large individual Sitka Spruce and Redcedar trees, the land does not have stands of conifers that might be called "ancient forest" or "old growth forest". Its value derives from its continuity with the forested lands of the park, and is highest in its use as wildlife habitat. Such riparian lands are relatively rare in

BLANK
PAGE

DESCRIPTION OF TRACT TO BE CONVEYED TO TACOMA PUBLIC UTILITIES

[illegible]

[illegible]



LINE TABLE

NO.	BEARING	DISTANCE
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
[illegible]

PROPOSED BOUNDARY REVISION
OLYMPIC NATIONAL PARK
AND
TACOMA PUBLIC UTILITIES

the narrow valleys of the Park, and are important to wildlife. Approximately 11 acres may be described as wetlands, though the area remains unclassified by any formal survey. The wetlands values are a direct result of the Projects' operation, which results in seasonal or intermittent flooding of these 11 acres. Therefore, operation of the project at 738 feet elevation, as is the basis for this assessment, will not adversely affect wetlands values.

Natural Resources:

Several concerns for natural resources have been identified:

> Two bunches or bands of Roosevelt Elk migrate from summer range high in the Olympics down the narrow North Fork Skokomish valley, either staying at the head of Cushman Reservoir during the winter, or migrating through to the Lilliwaup Swamp. Raedke Associates was contracted to research and study the existing information about these elk. A report of this study is appended. In summary it stated that these bands of elk at present are not limited in numbers by availability of winter habitat. Instead, we should be concerned that the proposed boundary change will make these elk more vulnerable to hunting. The report recommends that responsible management agencies and the Skokomish tribe should cooperatively plan a protective management strategy.
>
> A territorial pair of Northern Spotted Owls resides in the Dry Creek drainage, along the Southwest shore of the upper portion of Cushman Reservoir. The nest site is not within the prescribed 2.2 mile radius of concern for possible effects, however the park has requested that the US Fish and Wildlife Service review the proposed action. As wildlife habitat will not be altered, nor other changes made in the use of the lands to be deleted, unless informed otherwise the park will assume that the Northern Spotted Owl will not be affected by the proposed action.
>
> Similarly, the lands to be deleted are used seasonally by Bald Eagles feeding on fish or other wildlife (including carrion) and by the Bull Trout, which spawns in the river above the reservoir. USFWS review of these species habitat concerns also is requested.
>
> An exotic plant, Reed Canarygrass (Phalaris arundinacea), has invaded the park within the areas to be deleted. (See Illustration #6, p.21) Control of this species with intent to eradicate it may be undertaken by the park. Unless agreement with TPU to control this species is included in the terms of the land exchange, it is unlikely that the

park can eradicate the species, as it will reinvade. It is anticipated that a control program will be supported by TPU.

Cultural Resources:

The Skokomish Tribe has expressed concerns about possible effects of the proposed land exchange on their traditional and accustomed use of the area. While Congress has changed the park boundary elsewhere previously, these changes have either added lands to the park, or have passed park land into other federal ownership. Thus, this proposed land deletion which will place what is now federal, park land subject to treaty-reserved rights of the Skokomish into private ownership is unique. Congress, and the National Park Service, must give full consideration to Skokomish tribal rights protected by law, such as: the American Indian Religious Freedom Act (AIRFA), and the Native American Graves Protection and Repatriation Act (NAGPRA).

The National Park Service has performed a cultural survey of the lands proposed for deletion from the park. A summary of the report of findings of the survey is appended.

The historic background is reviewed. No historic structures or historically significant locations appear to be within the proposed exchange area. The trail used by Lieutenant Joseph P. O'Neil may or may not have gone through the area.

An archeological survey found no artifacts. The area surveyed included both inundated and exposed park lands, except for active river channels. The inundated lands were surveyed during a reservoir draw-down during the spring, 1991. This negative result does not imply that there are none, simply that the survey, conducted at what is felt to be an adequate level of detail with appropriate methodology, failed to find any. Nor does the result imply that native Americans do not, or did not, use these lands. The Skokomish have strong traditional connections to this land and continue to carry on cultural practices here.

The ethnographic component of the cultural survey had two goals: first, to identify specific populations that have either traditional associations with park resources and /or continuing uses of any natural or cultural resources within the park; and, second, to determine if certain ethnographic resources known to or used by contemporary Skokomish might be located within the area proposed for exchange. One culturally sensitive area is within the is required to determine steps appropriate to the treatment and protection of this culturally sensitive area.

The federal government has a trust responsibility to advance the interests of the Skokomish Tribe. The initial role of the National Park Service is to make Congress aware of the potential effects of its proposed action, and to recommend appropriate steps. This document in part will serve that purpose.

8.3 The two tracts totalling 40 acres in the Soleduck valley are bisected by the Soleduck Valley Road, and support mature second growth coniferous forest. (See Illustration #3, p. 9) These tracts are approximately 1/4 mile into the park along the road. There are no markers or natural features that serve to give this property identity apart from contiguous park lands.

The lands are wildlife habitat, providing thermal cover in winter for elk and deer, some browse, and shelter proximal to the Soleduck river riparian lands and other near-by wetlands which sustain elk through the winter. These lands also provide a high quality park experience for motorists, as the recently re-constructed Soleduck Valley Road is designed to bring the edge of wilderness to the road shoulder, providing views of mature conifers grouped and singly, apart from their kind by their large size, and landscape vistas of the course of the river through the forest.

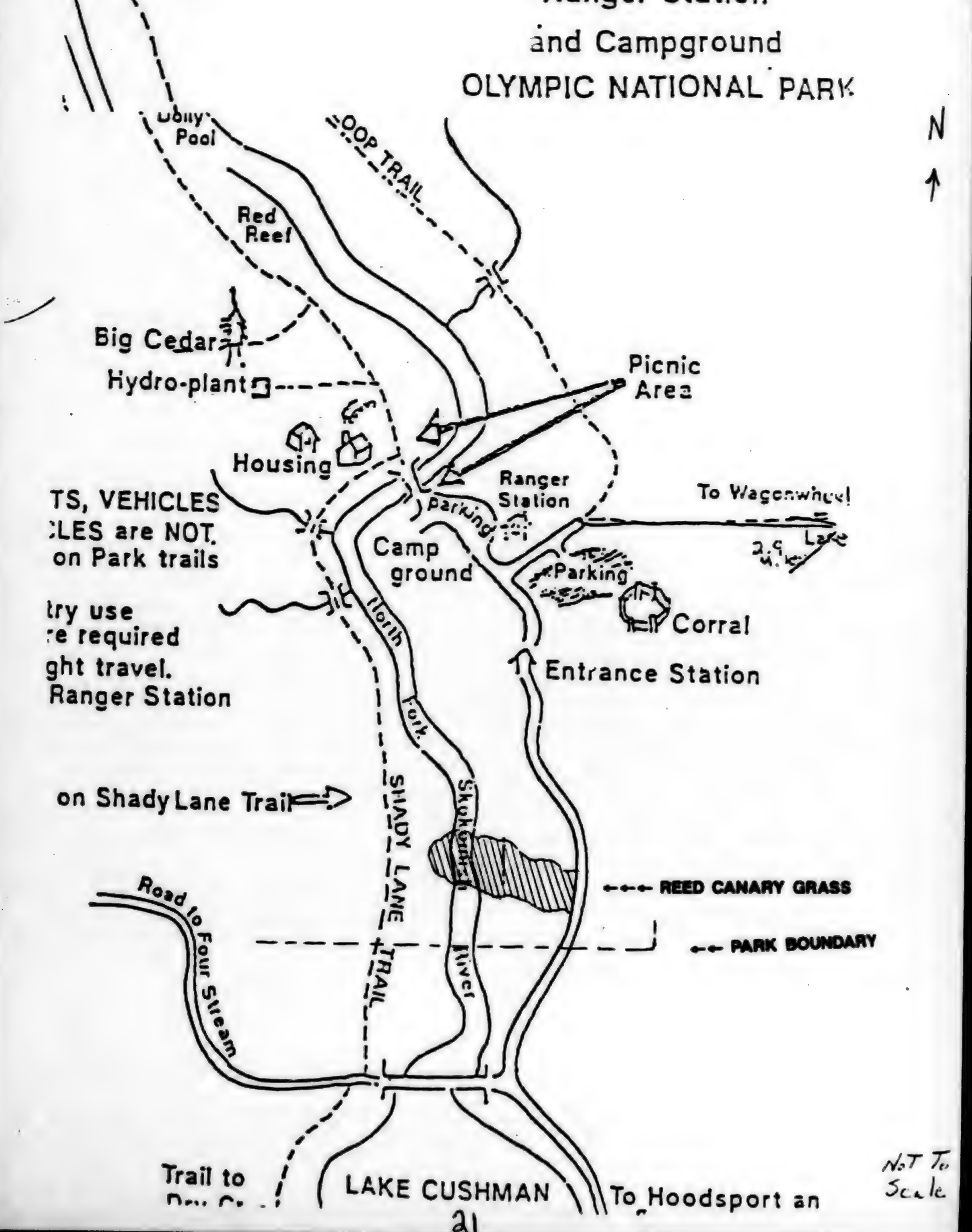
8.4 The Quileute Valley tract is a 5 acre parcel in the coastal area of the park along the park boundary, south of the Quileute River. (See Illustration #4, p. 10) The lands have been logged within the past 40 years, but are not currently accessible from any maintained road or trail. A first order stream originates within and flows from the Tract into another unnamed stream, which flows into the Pacific Ocean at Strawberry Bay.

The parcel is within the authorized park Wilderness Area.

Illustration #6

Illustration #6 is a map, showing location of Reed Canarygrass (*P. arundinacea*) in vicinity of park boundary at Cushman Reservoir.

Ranger Station
and Campground
OLYMPIC NATIONAL PARK



TS, VEHICLES
CLES are NOT
on Park trails

try use
re required
ght travel.
Ranger Station

on Shady Lane Trail

9.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

9.1 Preferred Alternative

Several issues or concerns regarding effects of the preferred alternative on wildlife were voiced in the scoping process, and in the federal filing with FERC.

A study of Roosevelt Elk winter range in the affected area is presented as Appendix B. Dr. Raedeke found no evidence that the two bunches of elk that migrate through the affected area, or take up winter residence in the area, are limited by available winter range. Instead, he suggests, hunting mortality, including poaching, may be a more significant factor. He advises that responsible management entities (in this case, the Skokomish tribe, Washington Department of Wildlife, and Olympic National Park) should enter an agreement to provide additional management protection of these elk.

During negotiation with Olympic National Park over the land exchange, TPU has agreed to manage the (former) park lands in their present state, i.e., as wildlife habitat. TPU would not take any action that might lessen the value of these lands to elk and other wildlife. TPU has stated that the Project lands would remain closed to public hunting.

Surveys for Northern Spotted Owls have been conducted. Reports of these surveys are presented in Appendix C. A pair of owls responded to calling in the Dry Creek drainage. The pair first responded during the initial survey in 1991, and again in May, 1992. The affected lands are not within the prescribed habitat circle (2.2 miles radius). A single owl responded to informal calling along the Staircase Road near the park boundary during the winter of 91/92. Attempts by the calling team which located the Dry Creek pair to raise a response from the single bird in May were not successful. It is likely that this single bird has left the area; if it remains, it has probably not mated, as paired birds respond very readily to calling within their territory. Under the self-imposed management terms by TPU, no changes to the lands leaving the park which would lessen wildlife values would be permitted. Therefore, the present value--i.e., as dispersal or foraging habitat--to Northern Spotted owls would continue, undiminished.

A study of the hydrology of the affected area (Appendix D) was conducted to address concerns that operation of the project itself would change vegetation on the affected lands, thereby impacting wildlife. The conclusion reached by Applied Geotechnology, Inc. was that the groundwater table of the affected lands responded to changes in the flow of the North Fork Skokomish River, was not influenced by the elevation of the reservoir up to 738 ft, c.d.. It is improbable, therefore, that successional change in the affected lands vegetation will be influenced by the Project beyond the extent actually inundated, approximately 11 acres at 738 feet; i.e., there will be no change in the vegetation, no lessening of wildlife values if the land exchange action as proposed is consummated.

Fish and fishery resources of the affected area have been the subject of concern by the National Park Service and the public, as well as the Washington Department of Wildlife, and the Skokomish Tribe. The Bull Trout is listed by the US Fish and Wildlife Service as a Category 2 species, one that is under consideration for rare, threatened, or endangered status under the Endangered Species Act. A population of Bull Trout spawns within the affected area. Little else is known about other aspects of its life history. It is probable that juveniles move down into the reservoir and feed on Kokanee and other smaller fishes, eventually reaching the remarkable large size that characterizes the population of adult spawners. To protect the spawners (which are highly vulnerable in the low, clear waters of the late autumn flows), the Park and Washington State Department of Wildlife closed the fishery. Since, the population has recovered from an estimated low of less than 60 adult spawners, to at least a few hundred, based on redd surveys conducted by the Park and the Department.

Based on the earlier-cited hydrology study (Appendix D), and agreement by the Applicant regarding operating the project at 738 feet, there is no reason to expect any adverse impacts on Bull Trout resulting from the proposed action.

Another fishery concern is for the population of Chinook salmon that reside in the reservoir and spawn in the affected river reaches above the reservoir. While the Chinook remain open to harvest, there is no apparent or probable affect on Chinook from the proposed land exchange/deletion from the park.

Fishery management issues are among those which are connected to the large scope of the licensing process. During negotiations for mitigations, TPU has agreed to enhance the reservoir fishery by rearing and planting Kokanee and Cutthroat trout. Among effects that are possible, (a) the food base for Bull trout and Chinook will be increased, thereby enhancing these populations; or, (b) competition for food at secondary levels of production will put juvenile Bull trout and Chinook at a disadvantage, thereby adversely affecting survival to adult for these species; or, (c) recreational fishing pressure on enhanced (planted) stocks of Kokanee and Cutthroat will harvest Chinook and Bull trout disproportionately to their numbers, thereby depressing spawning populations of the Chinook and bull trout below sustainable numbers. It is desirable that management entities agree to monitor effects on Chinook and Bull trout of the proposed mitigation to be conducted under the licensing conditions.

Restoration of anadromy to the river above the Project impoundments was also a concern. The proposed land exchange/boundary change action will not affect anadromy, as initial construction of the dams without provision for fish passage destroyed the portion of the runs that had spawned in the upper river. Discussion of restoration of anadromy will take place in negotiations for mitigation during the licensing process. Agreement by the National Park Service to negotiate a land exchange/boundary change to relieve the encroachment, pursuant to the applicant's project licensing application does not constitute approval by the Park of any operating requirements to which the new license may be conditioned. The Agency does not waive its right to stipulate conditions, including the restoration of anadromy if it should be considered necessary and feasible, in consideration of the purposes for which the park was established, and the obligations and responsibilities of the Secretary of the Interior.

Under Alternative A, the preferred alternative, cultural values identified by the Skokomish Tribe may be affected. The Tribe has stated that the affected lands are part of a larger traditional use area that is affected by the Project, and mitigations must be negotiated as part of the licensing process.

The National Park Service has performed a cultural survey of the affected lands. A summary report of results of the survey is presented as Appendix E. Although no archaeological discoveries were made, an ethnographic resource is within the affected area. This resource requires further evaluation and consultation before a determination of eligibility to the National Registor of Historic Places can be made.

9.2 No Action (status quo)

"No Action" would not relieve the trespass, nor the dispute over jurisdiction, hence may lead to litigation. While litigation would, ultimately, resolve the issue, an adjudicated settlement likely would not be timely and would delay both the licensing environmental review and negotiations for mitigations.

9.3 725 foot elevation

Limiting the operation of the Project to a maximum elevation of 725 feet, C.D., would broadly and directly affect natural and cultural resource values, including recreation, and economics, of the entire Cushman Project area. While this action would resolve the encroachment and jurisdiction issues, and perhaps benefit elk, fish, and other wildlife in the long run, adverse impacts would be substantial. These include public recreation and safety, and property values. It is beyond the scope of this document to attempt thorough analysis and presentation of this alternative. Therefore, it is presumed for purpose of this DEA that 738 feet elevation will be the operating level of the Project.

10.0 LIST OF REVIEWERS

Gordon Atkins, NPS, PNRO
Paul Gleeson, NPS, OLYM
Ron Hyra, NPS, PNRO
Joel Wagner, NPS, Water Resources Division, Denver, CO.
Rick Wagner, NPS, PNRO
Jacilee Wray, NPS, OLYM
Fred York, NPS, PNRO

11.0 CONSULTATION/COORDINATION DURING PREPARATION

A scoping process was conducted by Triangle Associates, under contract to Tacoma Public Utilities, at the request of the National Park Service. Appendix F details the scoping process, and presents documents, including a Scope of Work, List of Person and Agencies Consulted, and compilation of written comments received.

Two scoping meetings for the public were held. At each meeting Mr. Garth Jackson, TPU, and Mr. John Aho, ONP, answered questions and explained the issue at a one-hour-long 'open house' before the prepared agenda began, and during the meeting. Several maps of the proposed land exchange and boundary change areas were displayed at each meeting.

On June 10, 1992, at Olympia High School, 147 people registered. No elected officials spoke. Two (2) representatives of organized groups spoke: Mr. Lou Mott, Chair person of the Save Our Lake Committee, and Ms. Polly Dyer, President of the Olympic Park Associates. Ten (10) individuals spoke.

On June 11, 1992, at Hoodsport Community and Fire Hall, 189 people signed in. One (1) elected official, Mason County Commissioner Bill Hunter, spoke. Four (4) representatives of organized groups spoke: Mr. Theo Martin, Cushman Maintenance Co. Board of Trustees; Mr. Lou Mott; Ms. Polly Dyer; and, Mr. Victor Martino, Cushman Project Manager for the Skokomish Tribe. Eight (8) individuals spoke.

By June 25, 1992, Triangle Associates had received 81 letters or comment sheets from individuals, families or informal groups, four letters from elected officials (two of which were addressed to Mr. Lou Mott from US Senator Slade Gorton and WA

Senator Brad Owens, and submitted for the meeting record by Mr. Mott, and five letters from organized groups: Olympic Park Associates, Skokomish Indian Tribe, Lake Cushman Maintenance Co., Cascade Chapter of the Sierra Club, and Twanoh Group of the Sierra Club.

Concerns expressed by the Skokomish Tribe, agencies, organizations, and/or several individuals during scoping [before the writing of this document] are addressed in the following section. Comments for the Skokomish Tribe are presented verbatim, as these address largely treaty-established rights and laws not applicable to the use of the affected area by the general public.

11.1 COMMENTS on behalf of the Skokomish Tribe in a letter from Mr. Victor Martino, Cushman Project Manager:

> COMMENT: Recognizing that the existing and proposed additional flooding of Olympic National Park by the Cushman Project is connected to FERC proceedings for the Cushman Project and that a separate environmental assessment is not appropriate, I have identified some of the issues that should be examined in any environmental assessment for the proposed action.
>
> - Investigate the effects of the proposed action and alternatives on the treaty rights and reservation lands of the Skokomish Indian Tribe. Address the trust responsibility of federal agencies to protect rights of the Skokomish Tribe.

(RESPONSE) For the purpose of this environmental assessment an assumption has been made that the Cushman Project will continue to be operated at elevation 738 feet, C.D.. A set of alternatives has been presented and discussed. The proposed boundary change and the reservation lands of the Skokomish Tribe are miles apart. However, certain lands of cultural importance to the Skokomish Tribe would be removed from federal ownership. Congress, in considering the effects of proposed legislation which would direct or authorize the deletion of these lands from Olympic National Park, must address Skokomish tribal treaty rights, and laws pertaining to American Indian rights.

There is no stated or implicit guarantee in the Act establishing Olympic National Park that the authorized boundary may not be changed. As Congress changes the boundary, so the lands within are subject to treaty-reserved rights of native Americans. The National Park Service will continue to uphold its trust responsibility on all lands within the authorized boundary of Olympic National Park.

- Assess the relationship and degree of connection between the proposed action and issues being considered in FERC licensing proceedings and environmental review for the Cushman Project.

(RESPONSE) "Connectedness" has been explained [Section 3.1], and connected issues identified in this document.

- Identification and evaluation of alternatives that would make the proposed action unnecessary, including: denial of FERC license and removal of Project; operation of the Project at a lower reservoir level that avoids use of Park lands. Examine the effects of a lower reservoir level and resulting restoration of free flowing river and riparian habitat on resident and anadromous fish, resident and migratory wildlife, threatened and endangered species, access to traditional cultural properties by the Tribe, and flood protection. Address restoration of vegetation to the denuded area of former reservoir and provision for recreational access to the public and Tacoma Public Utilities leaseholders.

(RESPONSE) Alternatives have been identified and evaluated. As stated earlier, this DEA assumes operation of the Project at elevation 738 feet, C.D., so license denial and project removal are not an alternative within the scope of this document. Operation of the Project at elevation 725 feet is, for the same reason, not considered an alternative. The effects of license denial, or operation at a lower elevation, upon natural or cultural values, or public safety, are proper subjects for the FERC environmental review process. Threatened and endangered species that may use the affected park lands are identified in this DEA, and are the subject of current discussion with the US Fish and Wildlife Service. At 738 feet there will be no denuded area of former reservoir to revegetate. Recreational access by the public will be the same as it is currently on the 30 acres TPU will acquire. As far as is known by the NPS, TPU has but one lessee, the Cushman Development Corporation, which then sublets lots to individuals. Lessees have no more or no less privileges of use of the former park lands than any other citizen.

Access to "traditional cultural properties" by the Skokomish Tribe must be considered by Congress in its action. Specific legislative language and other intent of Congress may be implemented by the Secretary of the Interior in consummating the land exchange.

- Examine the Cushman Project boundaries under 1924 FERC minor part license and describe in detail Park lands to be affected by flooding and associated environmental impacts.

In 1988, FERC requested additional information from TPU regarding Cushman Project boundaries and flooding of National Park and National Forest lands (FERC Request for Additional Information, Nos. 13 & 14: July 22, 1988). TPU has not satisfied FERC's request for information about Project boundaries, nor its request for site specific information regarding federal lands to be flooded and the associated environmental effects.

(RESPONSE) There is no purpose to be served in the scope of this assessment to examining the 1924 Project boundary, as there is no argument about whether the Project encroaches on the Park, and the proposed boundary change would relieve this situation. The description of the affected lands is of sufficient detail in consideration of the resource values contained therein, and the possible effects of the proposed action. Whether or not FERC's requests for additional information have been satisfied is not pertinent to this environmental review process. TPU has funded several of the studies requested by the Park to gather information to present in this document.

- Investigate compliance of the Cushman reservoir at normal and proposed maximum levels with State regulations regarding reservoirs and water storage capacity.

(RESPONSE) Investigation of compliance with Washington State law would serve no apparent purpose within the scope of this environmental review.

- Examine the effect of flooding to the 742 elevation (Cushman Datum) on Tacoma leaseholders, public recreation opportunities, fish and wildlife and cultural resources along the perimeter of the reservoir. Examine the authority of the Cushman Project to flood to this level under the 1924 FERC minor part license, under which it operates by annual extension.

(RESPONSE) As stated, this document assumes operation at the 738 foot elevation. TPU has stated that FERC stipulated the 742 feet elevation for purpose of project management (flood control), not as the operating level of the Project. Therefore, discussion of the effects of operation at the 742 foot elevation is irrelevant. Regarding FERC authority to license a Project within the authorized boundary of Olympic National Park, this is a key purpose for proposing the boundary change action. The USDI contends that FERC lacks such authority.

- Document why the land along the North Fork Skokomish River at the head of the reservoir was added to the Olympic National Park in 1940. Assess how removing this land from the Park would affect value of the Park as a UNESCO Biosphere Reserve and World Heritage Convention World Heritage Site.

(RESPONSE) Legislation establishing the Park is described adequately in this document. Much of the resource value of the affected land obtains from its being part of a contiguous whole, is not identified as being uniquely contained within the 30 acres, or even within the Skokomish Valley. As discussed in this document, the resource values will not be diminished as a result of the proposed action. Therefore, Biosphere Reserve and World Heritage Site status will not be jeopardized.

- Assess impacts to fish, wildlife, cultural resources and other environmental values from trespass on and use of U.S. Forest Service and Olympic National Park lands by the Cushman reservoir for over half a century and examine alternative mitigation/compensation measures.

(RESPONSE) It is beyond the scope of this document to address Cushman Project impacts to U.S. Forest Service lands. The National Park Service continues to participate in the Cushman licensing issue, and will seek to resolve its concerns through that process after the potential for jurisdictional dispute is relieved.

- Evaluate the effect on reservoir operations of alternative instream flow releases below dam #2 necessary to rehabilitate fish habitat conditions in the North Fork and mainstem Skokomish River and estuary, to restore the physical condition and biological productivity of the river channel and estuary, and to maintain the channel capacity and reduce the frequency of overbank flooding of the mainstem river.

(RESPONSE) How the Project is operated and the effects of alternative flow releases is properly the subject of the FERC environmental review process, is not within the scope of this document.

- Examine the loss of federal protections for fish, wildlife and cultural resources, and for cultural use by the Skokomish Tribe under the American Indian Religious Freedom Act, presently afforded to Park lands proposed for transfer out of the Park.

(RESPONSE) The removal of fish, other wildlife and cultural resources from federal protection is discussed at length and in adequate detail in this document. Restating an earlier response, there is no intent stated or implicit in the Act Establishing Olympic National Park that the boundary may not be changed. A summary of a report assessing the effect of the proposed action on the cultural practices of the Skokomish Tribe has been presented. It remains for Congress to assess the effects of its proposed legislation on treaty rights of the Skokomish Tribe, or use of the affected lands under the American Indian Religious Freedom Act.

- Investigate the effects of the proposed action and alternatives on the Skokomish Tribe's continued cultural and spiritual use of an area of the North Fork Skokomish river valley upstream from the effects of the reservoir. The Tribe and other cultural resource agencies are not satisfied with cultural resource surveys done by Tacoma as part of the FERC proceedings, and the Tribe has requested FERC to order additional studies.

(RESPONSE) A study of the Tribe's use of the affected area, including upstream of the 30 acres, has been performed by the NPS. Because of the sensitive nature of ethnographic resources, details about such areas are confidential. A summary of that report is appended to this document. The proposed action may affect Tribal cultural use of the area. Additional consultation with the Skokomish Tribe is required to ensure protection of Tribal access and use, and, also, before a determination of eligibility to the National Register of Historic Places can be made.

- Identify and assess alternatives to the particular land exchange proposed. The land to be transferred to Park ownership must be included in the environmental assessment, in addition to land to be transferred out of Park ownership. Alternatives to the proposed Soleduck exchange parcel should be identified that provide mitigation for environmental impacts within the Skokomish River basin and/or to fish, wildlife and cultural resources affected by the proposed land exchange and park boundary diminishment.

(RESPONSE) The lands to be transferred to park ownership are identified. These lands are within the Congressionally-authorized park boundary; therefore, the value of these lands has been established. This document does not further identify specific resource values on the lands to be acquired. In early discussion with TPU, the NPS did seek lands with resource values in the vicinity of the boundary with the Cushman Project lands that might be added to the Park. TPU did identify some tracts that it would attempt to reacquire from the lessees. In review by the Park, this offer was inadequate, did not enhance the park's management of resources, and so was rejected.

- Assess how the proposed action would affect public recreation opportunities and the proportion of land surrounding the reservoir that is committed to private use by Tacoma leaseholders and that available for public use.

(RESPONSE) This document addresses effects of the proposed action on public recreation opportunities. The lands that would leave the park would remain available for public use of the same kind that occurred while the land was in the park. Public recreation opportunity on other Cushman Project lands is not affected by the proposed action.

- Analyze the effect of Congressional legislation required to change the Park boundaries for compliance with the National Environmental Policy Act.

(RESPONSE) The legislation is not an NPS action, and is not subject for this environmental review.

11.2 COMMENT: The Twanoh Group of the Sierra Club supports the NPS exchanging lands at the head of the Cushman reservoir and the boundary change, but expressed several concerns and preferences:

...Lands to go to TPU must remain unchanged and title transfer must so stipulate.

RESPONSE: The draft legislation now in committee has language so stipulating.

...TPU should not be allowed to raise the Cushman reservoir level above 738 feet.

RESPONSE: For the purpose of this DEA, an elevation of 738 feet is presumed. The determination of the Project operating level will be addressed in the environmental review conducted by FERC. TPU has stated that the planned and intended operating level of the Project is 738 feet. Any impoundment at a higher level will be temporary, the result of flood events, and the project will be returned to 738 as soon as possible in consideration of public safety and fishery impacts.

...a literature search of the elk habitat at the upper end of the reservoir as stated at the public meeting is inadequate and needs actual research.

RESPONSE: The Raedeke study determined that there is substantial information about elk use of the area, adequate to address the concerns expressed: whether or not winter range is a critical factor in the maintenance of these elk and, whether the proposed action would adversely affect these elk.
We suggest that the study be reviewed, and any criticisms be made in response to this DEA. It is agreed that migratory elk herds in the Eastern watersheds of the Olympic Peninsula

deserve special management attention, including research and monitoring, to ensure their population survival in the coming decade. This would include the Skokomish elk throughout the watershed.

> ...the reservoir level needs to be brought up to the 738 foot level to preserve fish habitat.

RESPONSE: (see Response this section above) It is agreed that a relatively constant water level would provide better fish habitat, and enhance wildlife values, in general.

> ...the lands identified for exchange are inappropriate. Other lands are more critical (Lake Crescent).

RESPONSE: The NPS included a major, private inholding at Lake Crescent among properties suggested to TPU. For various reasons, TPU elected to work with the DNR tracts. The NPS recognizes the pressure for development of the Lake Crescent property in question. The NPS does not feel that acquisition of the Lake Crescent property through this transaction would be timely enough to ensure against clearing and development of the property. There are no other inholdings, private or State of Washington lands, within the park boundary that would be acceptable. Therefore, the NPS would accept the DNR tracts in exchange for the Cushman boundary property.

11.3 The letter from the Olympic Park Associates expressed concerns similar to those of the Sierra Club, as well as the following COMMENT: "A full Environmental Impact Assessment is required for the proposal for deleting any part of Olympic National Park." The OPA also requested that the EA be "upgraded" to an Environmental Impact Statement.

RESPONSE: The NEPA compliance process is described elsewhere in this document. We agree that environmental impacts must be identified and assessed. We have stated that the FERC EIS must address cultural and natural resource issues.

11.4 Eighty-two letters and comment sheets from the public were submitted in support of the proposed land exchange. Essentially all expressed the view that the reservoir should remain at 738 feet elevation, citing property values, wildlife habitat values, and/or recreation values that would be lost if the reservoir is not filled.

RESPONSE: These concerns are presented and discussed appropriately in the text of the document.

12.0 APPENDICES

A. Letters/filings from USDI Secretary, Office of the US Solicitor, to FERC.

B. Report of Raedeke Associates: "Assessment of Elk Habitat

C. Letters/memos reporting results of Northern Spotted Owl surveys

D. Applied Geotechnology, Inc. Report: "Groundwater-Surface Water Interaction Study. Lake Cushman and North Fork Skokomish River

E. Summary Report of Cultural Resource Surveys

F. Scoping Process: Final Report

G. North Fork Skokomish River - Fish Surveys

Appendix A

Letters/filings from USDI Secretary, Office of the Solicitor, to FERC.

JAN 1979
OFFICE OF
REGIONAL SOLICITOR
PORTLAND

BEFORE THE UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

In the Matter of CITY OF TACOMA, WASHINGTON- CUSHMAN PROJECT	PROJECT NO. 460 PETITION OF THE SECRETARY OF THE INTERIOR FOR LEAVE TO INTERVENE

I.

Cecil D. Andrus, Secretary of the Interior, pursuant to Section 1.8 of the Federal Energy Regulatory Commission's Rules of Practice and Procedure, 18 C.F.R. 1.8, hereby petitions the Commission for leave to intervene in the proceeding before the Commission captioned Project No. 460, the Cushman Project, located on the Skokomish River in Mason and Pierce Counties, Washington. Correspondence or other communications in regard to this proceeding should be addressed to:

Daniel Rosenfelt, Assistant Solicitor
Office of the Solicitor
Room 6445
United States Department of the Interior
Washington, D.C. 20240

II.

This Petition is made by reason of the impact of the operation of Cushman Project No. 460 upon programs and resources for which the Department of the Interior has duties, responsibilities and concerns as follows:

A. The United States Fish and Wildlife Service (Fish and Wildlife Service), a bureau of this Department, is vested with statutory authority to ensure the protection of fish, shellfish and wildlife resources of the nation. See, e.g., Fish and Wildlife Act of 1956, 16 U.S.C. § 742a, et seq; Fish and Wildlife Coordination Act, 16 U.S.C. §§ 661 et seq. Operation of the Cushman project in its present and projected manner obstructs virtually all water flow in the lower North Fork of the Skokomish River and substantially diminishes water flow on the mainstream of the Skokomish River. The resultant deleterious effect on fisheries and other wildlife resources makes it necessary and desirable for the Fish and Wildlife Service to participate in this proceeding.

B. The Secretary of the Interior is responsible for fulfilling the fiduciary and statutory duties of the United States to the Indians, including protection of the rights of the Skokomish Indian Tribe. Diversion of the waters of the Skokomish River, which has substantially reduced the flow of water through the Skokomish Indian Reservation, and the concomitant loss in anadromous fish interferes with the exercise of fishery rights reserved by the United States for the Skokomish Tribe, as recognized in *United States v. Washington*, 384 F. Supp. 312, *aff'd* 520 F.2d 676 (9th Cir. 1975), *cert denied* 423 U.S. 1086 (1976). The continued diversion and use of these waters by the City of Tacoma is also inconsistent with those water rights reserved for the use of the Skokomish Tribe when the reservation was established and interferes with the purpose for which the reservation was created.

C. The proposed project is within the resource area being examined by the Administration's Task Force on Pacific Northwest Fisheries. That Task Force, comprised of the Solicitor of this Department, the Deputy Under Secretary of Commerce, and the Assistant Attorney General, Land and Natural Resources Division, has as its principal goal the development with local interests and Washington State of enhancement proposals and resource management objectives which will provide an improved fishery resource. The Task Force's planning effort must be kept in mind by the Commission when issuing this new major license for the Cushman Project No. 460.

D. The National Park Service, a bureau of this Department, is authorized to administer and protect designated lands within the National Park System, including the Olympic National Park. The interests of the National Park Service are affected by this proceeding because the Cushman Project inundates lands within Olympic National Park. Raising the maximum operating level of Lake Cushman as requested in the license application will result in greatly increased inundation of these lands with a concomitant detrimental effect on plant and animal life and on the operation of the Park.

III.

For all the above-stated reasons, the Department of the Interior has a direct interest in these issues and good cause to intervene in this proceeding.

IV.

Section 1.8(d) of the Commission's Rules of Practice and Procedure (18 C.F.R. 1.8(d)) authorizes the Commission to permit the late filing of a petition to intervene on the basis of "extraordinary circumstances for good cause shown." The following reasons support authorization of the late filing of the Department of the Interior's petition:

A. Although the Department of the Interior has been aware of this proceeding since Department comments on the application were generated, the staff attorney assigned to this matter resigned and the case inadvertently was not reassigned to another attorney.

B. Numerous interests of the Department of the Interior affected by this proceeding can not be adequately represented by any other party. Thus, intervention by the Department is necessary to ensure a fair and complete result. Moreover, as a party to this proceeding, the Department may aid the Commission in resolving some of the more complex issues involved.

C. No present party to this proceeding would be prejudiced by the intervention of the Department of the Interior, and intervention by the Department would not jeopardize the timely resolution of this matter.

WHEREFORE, the Secretary of the Interior respectfully petitions this Commission to permit the late filing of this petition and to enter an order authorizing the intervention of the Secretary of the Interior in this proceeding and admitting the Department to the status of a party therein. As a party to this proceeding, the Secretary of the Interior will be seeking to exercise all authority granted by the Federal Power Act.

Dated this 21st day of December, 1978.

Respectfully submitted,

Daniel M. Rosenfelt
Attorney for the Secretary
of the Interior
Department of the Interior

United States Department of the Interior
OFFICE OF THE SOLICITOR
Pacific Northwest Region
500 N.E. Multnomah Street, Suite 607
Portland, Oregon 97232

MAR 19 1986

FWS.PN.0316

MEMORANDUM

TO: Regional Director, Region 1, FWS
Attention: Don Sundeen, Habitat Resources (ES)

Area Director, Portland Area Office, BIA
Attention: Bernard Bernham, FERC Coordinator

Regional Director, Pacific Northwest Region, NPS

FROM: Office of the Regional Solicitor

SUBJECT: FERC Project No. 460 - Application of City of Tacoma, Washington for Major License for Constructed Cushman Project

Attached for your information and use is a copy of a letter recently filed with the Commission in the above-referenced proceeding by the attorneys for the Department of the Interior, the Washington Departments of Fisheries and Game, the Skokomish Indian Tribe and the Point No Point Treaty Council.

For the Regional Solicitor

Susan K. Driver

Susan K. Driver
Attorney
Pacific Northwest Region

Attachment

cc w/attachment:
Charles A. Dunn, Field Supervisor, Olympia Field Office, FWS
Robert S. Chandler, Superintendent, Olympic National Park

OLYMPIC NATIONAL
RECEIVED
MAR 21 1986

Mr. Kenneth F. Plumb, Secretary
Federal Energy Regulatory Commission
825 N. Capitol N.E.
Washington, D.C. 20426

Re: In the Matter of the City of Tacoma, Washington
FERC Project No. 460 (Cushman Project)

Dear Mr. Plumb:

On November 5, 1974, the City of Tacoma, Washington ("Tacoma" or "the City") filed an application for a "New Major License For Constructed Project" for its Cushman Hydroelectric Project, FERC Project No. 460. This application has been pending before the Federal Power Commission and the Federal Energy Regulatory Commission ("Commission") for 12 years while the project continues in operation, despite repeated requests for hearings by the federal, state and tribal intervenors. While the powerhouse and other significant portions of the referenced project occupy federal Indian reservation lands, it has been allowed to operate since the mid-1920's under a minor part license relating only to flooding of federal lands at the upstream end of the impoundment.

It is the position of these intervenors — the Fish and Wildlife Service, the Bureau of Indian Affairs, the National Park Service, the Washington Departments of Fisheries and Game, and the Skokomish Indian Tribe — that the Commission should issue an order assigning this matter to an administrative law judge, setting a date for a pre-hearing conference, and setting the matter for hearing. It is further our position that the Commission should direct its staff to begin preparation of an environmental impact statement for this project. The intervenors are concerned that the continuing inaction of the Commission has directly and adversely damaged the resources in the Skokomish River Basin and the communities which rely upon them.

HISTORY OF THE PROJECT

The construction of the project occurred in two phases. The first phase began during the spring of 1924 and was completed on May 24, 1926. Construction of the second phase of the project began in 1928 and was completed on December 31, 1930. Little or no water has flowed in the North Fork of the Skokomish River since construction began on the project in 1924. The erection of a complete barrier to fish passage plus dewatering of the downstream reach virtually eliminated the historical anadromous fish runs. Because the project was built without adequate fish passage facilities, the dam has obstructed the use of potential anadromous fish habitat upstream from the project.

Despite the fact that the powerhouse and primary transmission lines are located on Indian allotments within the Skokomish Indian Reservation, the Cushman Project has never been fully licensed by the Commission. Tacoma began construction in 1924 after the Commission granted the City a "License for a Minor Part of a Complete Project." This limited license merely authorized the City to flood certain federal lands located at the upstream end of Lake Cushman. While this minor part license imposed some conditions relating to the flooding of those federal lands, no license was issued by the Commission which authorized either the generation of electricity, the occupation of trust lands within the federal Indian reservation, or the virtual destruction of Indian and non-Indian fisheries in the Skokomish River Basin.

In 1930, the Washington Department of Fisheries began discussions with Tacoma seeking mitigation for lost anadromous fish runs in the North Fork of the Skokomish River. In 1955, after 25 years of discussions, Tacoma contributed funds to study the losses from the existing Cushman project and a proposed expansion of the project. This study resulted in a 1957 report entitled Research Relating to Fisheries Problems That Will Arise in Conjunction With Current and Proposed Hydro Developments on the Skokomish River, Washington.

As a result of this study and in an effort to obtain some mitigation from Tacoma, the then Director of the Washington Department of Fisheries accepted some funding for the State's George Adams Fish Hatchery on the Skokomish River. However, that hatchery falls far short of mitigating for lost runs. It does not, for instance, even attempt to replace sockeye and steelhead runs. Furthermore, the City of Tacoma has made no further attempts to mitigate either by altering the operating procedures at the project or through other means. Because of the long period during which the downstream reach has been dewatered, only limited mitigation can now be obtained from improved flow regimes in what is now a silted and overgrown riverbed.

THE CURRENT PROCEEDING

In 1973, as the minor part license neared expiration, Tacoma asked the Washington Departments of Fisheries and Game to comment on the Exhibit "S" drafted as part of its application for a major license. Both Departments characterized that exhibit as deficient because it failed to provide data on fish and wildlife affected, failed to discuss flows in the bypassed reach of the Lower North Fork of the Skokomish River, and failed to discuss mitigation.

On November 5, 1974 Tacoma filed its "Application for a Major License for a Constructed Project." The Commission then ordered the project to be operated under annual licenses subject to the terms and conditions of the original minor part license until a new license was issued. The Washington Departments of Fisheries and Game, the Skokomish Indian Tribe and the Department of the Interior all intervened in the licensing proceedings.

During the summer of 1977, the intervenors all commented on the license application. Commenting on the Exhibit "S", the Tribe and the Department of Game recommended that various studies be done to determine the effect of the project on the fishery resources of the of the Skokomish River. Unfortunately, Tacoma and the intervenors could not agree on the nature and extent of these studies. As a consequence of this impasse, the Department of Game requested the Commission schedule a hearing to resolve these issues.

Rather than scheduling a hearing, on March 31, 1980 the Commission informed the Department of Game that it "anticipated action on the application prior to the end of 1980". The Skokomish Tribe, responding to this, requested the Commission to set a hearing schedule. The Commission did not respond to this request. In 1981 the Tribe and the Department of the Interior filed formal motions with the Commission asking that the proceedings by assigned to an administrative law judge and scheduled for a pre-hearing conference and hearing. The Commission has never responded to these motions which have been pending for more than five years.

POSITIONS OF THE INTERVENORS

The various intervenors have serious concerns that must be addressed by the Commission. Although these concerns can all be traced to the substantial loss of fisheries production in the Skokomish River Basin, each intervenor has specific concerns unique to their jurisdictional areas of responsibility.

WASHINGTON DEPARTMENT OF FISHERIES

The two large hydroelectric dams that form the Cushman Project have destroyed many river miles of anadromous fish habitat, causing long-term losses of chinook, coho, chum, sockeye and pink salmon. Only 8.5 miles of the original 35 miles of the North Fork Skokomish River is now available for migratory fish use. In addition, this 8.5 mile reach (located below the dam) provides merely a fraction of its original production because the dam diverts the majority of the North Fork flow into Puget Sound's Hood Canal. Further, habitat problems in the Lower North Fork are compounded because water temperatures have been elevated due to the extremely low flows that exist during the summer season.

In sum, river obstruction, low to non-existent flows, and the resulting increased water temperatures have virtually eliminated salmon production in the North Fork of the Skokomish River. This loss in one of Washington's primary production rivers has contributed significantly to the reduction of sport, commercial and tribal fishing opportunities not only in Washington's Puget Sound but throughout the region.

WASHINGTON DEPARTMENT OF GAME

The Cushman Project also has had a severe negative impact on anadromous game fish, resident game fish, and wildlife in the area. Steelhead, sea-run cutthroat and Dolly Varden have been all but eliminated from the North Fork Skokomish River drainage. In addition, the flooding of spawning and rearing areas upstream from the dam and the lack of instream flow to the North Fork downstream from the dam have severely damaged local resident game fish production. Further, habitat alterations — such as the flooding of lands by the reservoir, the powerline corridor, the roads, and of course the dams — have had a marked negative impact on wildlife. Migratory deer and elk herds, in particular, have suffered substantially reduced populations because Tacoma has flooded these animals' historical wintering area (the valley of the North Fork). Finally, a secondary impact to wildlife habitat has been caused by the development of vacation homes on property adjacent to the reservoir.

No mitigation has been provided for any of these losses; clearly, such mitigation is long overdue.

SKOKOMISH INDIAN TRIBE

The Skokomish Tribe and the Point No Point Treaty Council agree with the contentions of the Washington Department of Fisheries concerning the obstruction of fish passage to habitat above the dams and the dewatering of the stream below the dams. In addition, they wish to make more specific contentions concerning downstream effects, the value of the resource lost, the effects of that loss on the Skokomish Indian Tribe, and the legality of previous actions.

The bypassed reach downstream from the dams (the Lower North Fork of the Skokomish River) has been seriously damaged as fish habitat by altered bedload composition, altered channel maintenance flows, encroachment of the riparian zone, periodic flood spills which armor the streambed and blow out fish using the reach, and elimination of gravel recruitment.

The Tribe contends that obstruction and diversion of the stream directly and substantially interferes with federally guaranteed treaty fishing rights and water rights, as well as with the purposes for which the reservation was created, and that those portions of the project located on Indian land are there not only in violation of the Federal Power Act, but also in trespass. Further, the Tribe contends that the Commission's failure to carry out procedures required by federal law has been, and continues to be, a direct and costly violation of the federal trust responsibility under the Treaty of Point No Point.

The Tribe contends that the Commission has authorized the project without providing for adequate participation by the Tribe. The Tribe further contends that while a major portion of the project is on the reservation, there has been no compliance by Tacoma or by the Commission with the Federal Power Act with respect to requisite determinations that the project is consistent with the purpose of the reservation; conditions necessary to protect the reservation and the exercise of treaty rights there; and compensation for use of water, interference with fisheries, and occupancy of Indian land.

DEPARTMENT OF THE INTERIOR

The Department of Interior concurs in the positions stated above by the Washington Departments of Fisheries and Game, the Skokomish Indian Tribe and the Point No Point Treaty Council.

Of additional concern to the Department of the Interior is the fact that the Cushman Project's reservoir inundates lands located within Olympic National Park. Tacoma is seeking to expand its existing project and seeks authorization to raise the water level of Lake Cushman. This expansion, which would result in the flooding of an additional 22 to 25 acres of land located within Olympic National Park, is prohibited by the Federal Power Act in the absence of special Congressional authorization. The National Park Service is concerned that this expansion will result in a further diminishment of the already reduced wildlife habitat within Olympic National Park. Further, expansion of the project would lead to increased recreational activities along the upper reaches of the reservoir and present serious health concerns to park personnel due to lack of sanitation facilities for additional park visitors.

CONCLUSION

The intervenors have waited patiently for over eleven years for an opportunity to present evidence demonstrating past damages due to the construction and operation of the Cushman Project, and appropriate mitigation measures to remedy and compensate for these damages. It is unreasonable to expect the intervenors to wait any longer for a hearing on the City of Tacoma's Application for a Major New License.

For these reasons, we respectfully request the Federal Energy Regulatory Commission issue an order directing staff to begin preparation of an environmental impact statement for this project, assigning this matter to an administrative law judge, setting a pre-hearing conference and setting a schedule for appropriate hearings to receive testimony concerning the licensing of the City of Tacoma's Cushman Project, FERC Project No. 460.

Very truly yours,

FOR THE SKOKOMISH INDIAN TRIBE AND
THE POINT NO POINT TREATY COUNCIL

Russell Busch

RUSSELL BUSCH, Attorney
P.O. Box 15258
Seattle, WA 98115

FOR THE STATE OF WASHINGTON
ATTORNEY GENERAL

Annette Womac

ANNETTE WOMAC
Assistant Attorney General
Temple of Justice, AV 21
600 North Capitol Way
Olympia, WA 98504

FOR THE DEPARTMENT OF INTERIOR

Susan K. Driver

SUSAN K. DRIVER, Attorney
Office of the Regional Solicitor
Pacific Northwest Region
500 NE Multnomah, Suite 607
Portland, OR 97232

cc: City of Tacoma, Washington

Appendix B

Raedeke Associate Report: Study of Roosevelt Elk use of Park and other near land near head of Cushman Reservoir.

Final Report to: Harza Northwest Inc.
Attn: Ms. Pam Klatt
2353 130th Avenue N.E., Suite 200
Bellevue, WA 98005

Title: Assessment of Elk Habitat in
the Olympic National Park Proposed
Lake Cushman Land Exchange Area

Project Number: 91058

Prepared by: RAEDEKE ASSOCIATES, INC.
5711 Northeast 63rd Street
Seattle, Washington 98115
(206) 525-8122

Date: February 21, 1992

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 ASSESSMENT METHODS AND PROCEDURES 2

3.0 ELK HABITAT CONDITIONS 3

  3.1 Elk habitats in Olympic National Park 3
  3.2 Elk habitats outside of Park 4
  3.3 Future status of elk habitat outside of ONP 6

4.0 DESCRIPTION OF THE ELK POPULATION 8

  4.1 Review of elk population 8
  4.2 Elk movement patterns 9
  4.3 Elk habitat use patterns 10
  4.4 Elk harvest management 12
  4.5 Factors limiting the elk population 13

5.0 IMPACTS OF LAND EXCHANGE ON ELK 16

6.0 POTENTIAL MITIGATION 18

7.0 LITERATURE CITED 19

Appendix A. Scope of Services
Appendix B. Historical elk sightings in Staircase Area

List of Figures

1. Location of study area
2. Exchange lands
3. Wrigley's 1985 map of plant communities
4. Wrigley's 1985 map of elk winter range areas
5. Plant communities on TPU lands
6. Elk habitats classifications of TPU lands
7. Olympic National Forest - Forest Plan land use designations

1.0 INTRODUCTION

Approximately 20 acres of the Olympic National Park (ONP) at the northern end of Lake Cushman reservoir are inundated during summer at full pool elevation levels (738 feet) in the pool formed behind Cushman Dam. The dam has been owned and operated by the City of Tacoma Public Utilities (TPU) since the late 1920's. The 20 acres are just north of the southern boundary of the ONP where the North Fork of the Skokomish River empties into the lake (Figure 1).

TPU has proposed a land exchange with ONP to remove the area of inundation from the ONP. The ONP lands in question are shown in Figure 2, and include areas within the actual reservoir boundary and additional shorelines.

In response to this proposal by TPU, the ONP has requested that an analysis be conducted of the impacts of the proposed land exchange on the Roosevelt elk (*Cervus elaphus roosevelti*) population of the area. A scope of work for the assessment was developed in consultation with the ONP staff, and is attached as Appendix A.

The primary objective of the assessment is to determine the impacts of the land exchange on the long-term well-being of the elk herd that seasonally occupies the parts of the area that would be transferred out of the ONP to TPU. It should be noted that the impacts of the creation and operation of the Cushman Lake reservoir on elk and elk habitat in the area are not a part of the scope of the assessment.

Specific objectives of the assessment are to:

1. Describe seasonal habitat use patterns of the elk that use the proposed exchange lands.

2. Describe habitat use patterns of this herd outside of the ONP lands.

3. Determine the relative importance of the exchange lands to the long-term well-being of the herd.

4. Evaluate the factors affecting the well-being of this herd, including land management outside of the ONP, hunting, recreational impacts, etc.

5. Determine long-term trends in the habitat within the range of the elk herd.

6. Describe current and potential elk winter habitat along the margins of Lake Cushman, south to Dry Creek.

For the purposes of this report, the study area is understood to be the exchange lands and the immediately adjacent lands that are used by the elk during the winter. Based on their understanding of the movement patterns of elk using the exchange lands, the study area was defined by ONP staff as the exchange lands, and adjacent lands on the west side of the reservoir south to Dry Creek and the south flanks of Mount Rose on the north and east side of the reservoir (see Figure 1).

The study area specifically does not include distant winter range lands, such as the Lilliwaup Swamp area, that may be used by elk that transit from summer range in ONP through the exchange lands.

2.0 ASSESSMENT METHODS AND PROCEDURES

It was determined through the scoping of the assessment that the present study would be conducted through a site visit with ONP staff and a review of the existing information on the elk and elk habitat.

Specifically, the assessment would be based on the following sources of information:

- aerial photographs of the exchange lands,
- existing elk studies and or elk habitat assessment for the drainage and the region,
- a compilation of observations of elk in the area by ONP staff and local residents,
- a review of the current habitat status of the project lands,
- a review of the existing elk habitat models, and
- a review of the current and potential elk management regulations for the area.

Original research, other than the reconnaissance level description of habitat conditions, was not included in the negotiated scope of the assessment.

The original scope of the elk habitat assessment included reference to potential mitigation lands. At the time the original scope was negotiated, potential mitigation lands under consideration were adjacent to the exchange lands or in the immediate geographic area of the exchange lands. Lands currently under consideration for mitigation are geographically isolated from the exchange lands, and have been eliminated from consideration as part of the scope of the present study.

3.0 ELK HABITAT CONDITIONS

The study area is within the Western Hemlock (TSHE) Zone, which is dominated by western hemlock (Tsuga heterophylla) forests in the climax or old-growth condition (Franklin and Dryness 1973). The existing plant communities within the study area in ONP are generally the result of natural processes, such as succession, fire, and riverine disturbances, while outside the park human modifications such as logging, road and home building, and reservoir construction have altered the plant communities.

Reservoir construction influences the plant communities in the area immediately adjacent to the reservoir. The emergent wetlands in ONP, in an area that would otherwise be forest community, are the result of periodic inundation by the reservoir.

The entire area burned in a wild fire around 1700. This region of the Olympic Peninsula has a high fire frequency rating (Henderson et al. 1989).

3.1 Elk habitat in ONP and the Exchange Lands

The elk habitat within ONP is typical of the Olympic Mountain river valleys. The valleys are "U" shaped as a result of glaciation, with steep valley walls and broad, relatively flat valley bottoms. The vegetation is dominated by conifer forests of varying ages, depending on the fire history and other factors such as wind storms and erosional disturbance along the rivers. The plant communities along the river channels may contain wetlands, early successional shrub communities, deciduous forest stands, or young conifer stands. These latter plant communities are the result of natural disturbance such as flooding, river erosion and channel formation, fire, and wind storms.

The area at the head of Lake Cushman contains emergent wetland communities (grass and sedge meadows) resulting from annual inundation by the reservoir. These types of emergent wetland communities are found in some other mountain reservoir systems (e.g., Chester Morse Lake), and are heavily used by elk in winter when available (Raedeke and Paige 1987). In the Cedar River Watershed, these wetlands are key to the productivity of the elk herd and the survival of calf and yearling elk (Paige 1988). In the Wynoochee drainage to the west, there are active efforts by US Forest Service (USFS) and Department of Wildlife (WDW) to enhance the forage component of these communities to increase winter carrying capacity for elk.

The plant community cover types in the study area, including the ONP lands and the exchange lands, have been mapped by Wrigley (1985). His map of these lands includes the following vegetative units: alder/bigleaf maple flats, flood plain (grasses, sedges), and conifer forests (Figure 3). Wrigley (1985) also mapped elk winter range areas (Figure 4).

The "exchange lands" generally include the areas between the Staircase Road and the ONP boundary, east of a line running northeast from the intersection of the TPU lands, USFS lands and ONP lands just west of the reservoir, and back to the Staircase Road (see Figure 2). The exchange lands contain 29.83 acres.

Within this area are three basic plant community cover types during low water conditions in the reservoir, including from east to west: open water of the North Fork Skokomish River; exposed, unvegetated floodplain of the reservoir; persistent emergent wetland - PE (seasonally inundated sedge meadows); and, deciduous forest - D4 (alder/bigleaf maple flats, with dbh >21 inches). The approximate coverage of these cover types is 5.8 acres of open water, 2.5 acres of exposed floodplain, 8.8 acres of emergent wetland, and 12.7 acres of deciduous forest.

The deciduous forest stands immediately upstream from the emergent wetlands are also influenced by the reservoir to some degree. But a recent study of influence of the reservoir on groundwater indicates that the zone of influence does not extend much beyond the limits of the emergent vegetation. The majority of the valley bottom lands are under the influence of the river.

Based on the WDW elk habitat model, the deciduous forest stands and the emergent wetland area would be classified as elk foraging habitat.

The exchange lands do not contain any of the old-growth conifer stands that are found in the west side of the valley bottom, just upstream from the exchange lands.

3.2 Elk habitat outside of the Park

Outside of the ONP, the adjacent lands used by the elk are owned and managed by TPU and the US Forest Service.

TPU lands

Vegetative cover types on TPU lands have been mapped by Hosey & Associates as part of the Cushman Hydroelectric Project, FERC No. 460 (see Figure 5). These TPU lands have also been characterized as to elk habitat cover types, based on the WDW draft 1987 elk HSI model (Figure 6).

The TPU lands of principal concern are the lands that are periodically inundated by the reservoir, and the adjacent forest lands along the shoreline. The latter are forest stands that extend south from the ONP boundary, along the east side of the reservoir to Dry Creek, and to a lesser extent, are found on the lands on the north and east side of the reservoir, extending from the lake shore upslope to the ONP or USFS boundaries on the flanks of Mount Rose.

The emergent wetlands (PE) on the exchange lands and on TPU lands are seasonally inundated by the reservoir and were not mapped on Figure 6. The vegetation inventory was based on aerial photographs taken during full pool reservoir conditions when these areas were inundated. The emergent wetlands are inundated for a sufficient portion of the growing season each year, such that shrub or forest communities can not survive. The wetlands are dominated by perennial grasses and sedges that can tolerate long periods of inundation even during the growing season. Under typical Reservoir operating conditions, the emergent wetlands are inundated during the summer months, from May through August, and exposed for the remainder of the year.

Upstream from the PE wetland communities are deciduous forest stands (D-4) on the flood plain of the North Fork. These are successional forest stands that will be replaced by conifer forests if there is no additional disturbance such as fire, floods, or wind storms.

The forest stands south along the lake shore are either mixed conifer-deciduous forest or conifer stands. The mixed stand is classified as M-3, that is a mature successional stand, with trees ranging from 11.0 to 20.9 inches in diameter at breast height (dbh).

The principal conifer stands are second growth stands (C-2 or C-3) that originated after fire or logging. Diameters range from 5.0 to 10.9 dbh in the C-2 stands, to 11.0 to 20.9 dbh in the C-3 stands. These conifer stands immediately adjacent to the ONP appear to have originated from a fire, based on stand appearance from aerial photographs. The young conifer stands in the Dry Creek area have resulted from logging. The area around Dry Creek still shows clear evidence of logging roads and timber harvest boundaries on 1958 and 1962 aerial photographs.

There are small areas of mature or old-growth conifers (C-4, with dbh >21 inches) on the northeast side of the reservoir, on the flanks of Mount Rose. However, most of the forests on this side of the reservoir are managed by the USFS.

There are recreational residential lands, leased by the Lake Cushman Development Company, on the west side of the reservoir between the ONP boundary and Dry Creek. These lands have road access from the USFS road that crosses the north end of the reservoir. The residential units are generally summer homes, but year round use does occur. Two residential units have been built to date, and several others may be built in the future.

USFS lands

The USFS lands of concern are the forest lands to the northeast and west of TPU lands, upslope from the reservoir. On the northeast side of Lake Cushman the USFS lands include the area used by the migratory elk that migrate to the Lilliwaup Swamp. Plant community mapping and stand descriptions are not available at this time.

On the slopes of Mount Rose and Copper Mountain, plant communities appear to be unmanaged forest stands of varying composition and age, depending on past natural disturbances and site conditions. There are remnant patches of old-growth conifers, intermingled with young conifers forest stands that probably originated from past wild fires. Much of the USFS lands in this area are contained within the Mount Skokomish Wilderness Area.

USFS lands to the west are again dominated by conifer forests, with a mosaic of managed and unmanaged conifer forest stands. The lower slopes of the Dry Creek drainage were harvested in the late 1950's. These stands are now dense second growth conifer stands.

There have been recent timber harvests in the Four Stream area. The cuts are located generally above 2,000 feet, on areas that would be most likely used as summer range for elk.

3.3 Future status of elk habitat outside of ONP

The Forest Service lands in the study area are to be managed under the Olympic National Forest Plan, Alternative C (Figure 7). Under Alternative C, adjacent lands have been identified as: E1 - areas managed for timber production; A1A - primitive and semi-primitive non-motorized recreation areas; or B1 - wilderness areas.

Under the plan, portions of the Four Stream and Elk Creek drainages were the only areas identified as E1 in the lands adjacent to the study area. Several timber harvest units were planned for this area, and harvests were completed in this area in 1991. However, due to the discovery of spotted owls, this area is now likely to be reserved for spotted owl habitat (L. Hunter, USFS, pers. comm.). The E1 areas north of the Lilliwaup Swamp may also be reserved for spotted owl habitat.

As a result of adoption the Forest Plan and the changes due to spotted owl habitat considerations, elk habitat on the USFS lands adjacent to ONP will not be altered by forest management activities or other land management activities in the near future.

TPU lands

TPU lands will continue to be protected for elk and other wildlife as part of the long term land management program. There is no proposed change in the management of TPU lands within the study area, and existing elk habitats will be protected. Other TPU lands outside of the study area have been proposed for enhancement for elk and other wildlife as part of the licensing process.

However, there may be continued recreational residential development on the lands, leased by the Lake Cushman Development Company, on the west shores of the reservoir just south of ONP boundary.

4.0 DESCRIPTION OF THE ELK POPULATION

4.1 Review of the elk population in area

The elk use the exchange lands on a seasonal basis, spending the summer in the high elevations of the ONP, and moving into the lowland valleys in late autumn to spend the winter and early spring. In the late spring they begin the return migration to the higher elevations (Schroer 1986, 1988, Jenkins and Starkey 1984, Houston et al. 1990, Taber and Raedeke 1981, Raedeke and Taber 1979). The exchange lands are part of the autumn-winter-spring range complex that supports the elk of the North Fork drainage.

Elk sub-populations

There appears to be two distinct sub-populations, or herds of elk within the drainage. These sub-populations use the regions of drainage differently, and are subjected to different mortality factors. One sub-population is transient in the study area; it passes through the area during migration from summer ranges in ONP to winter range areas as distant as the Lilliwaup Swamp (i.e., outside of the present study area).

A second sub-population migrates to the study area lands in the fall, and spends the winter on the ONP and TPU lands at the head of the reservoir. More detailed descriptions of the movement patterns of these herds are provided in a later section of this report.

Elk population numbers

The number of elk in this drainage is not known. In historical records maintained by the ONP staff, there are accounts of up to 100 elk using the Staircase area in the fall. A herd of 100 elk was observed in 1963 at Finley Flat, which is now referred to as Beaver Flats, and herds of 20 to 30 elk were commonly observed wintering in the area (see Appendix B).

Moorhead (pers. comm.) estimated that winter range within the study area portion of the drainage could support 15 to 20 elk on a long-term basis. This estimate is based on the size of drainage and ONP's estimated elk densities in other similar drainages in ONP (see Houston et al. 1990).

Bowen (pers. comm.) estimated that in the winter of 1990-91 the valley supported approximately 50 total elk that moved through the area in two distinct bands. This estimate would include both winter residents elk and the transient elk that move through the area onto Lilliwaup Swamp and other winter range areas outside of ONP.

In the winter of 1984-85, Wrigley (1985) documented a total of 19 elk (5 bulls, 9 cows, 5 calves) wintering in the area from December 1, 1984, to May 27, 1985.

On November 2, 1991, a herd of 55 elk was observed at Finley Flats (Beaver Flats). This herd was thought to have moved onto the Lilliwaup Swamp (Schirato, pers. comm.). A second herd of 22 elk, assumed to be distinct from the herd of 55 elk, was noted in the Staircase area on November 14, 1991 (G. Bowen, pers. comm). This latter group, which would be the winter resident, spent part of the time outside of the park, and at least one bull has been harvested to date.

Based on these observations, there would be a minimum of 77 elk using the drainage the winter of 1991-92, with approximately 30% winter resident and 70% transient elk.

4.2 Elk Movement Patterns

There have been no studies of the movement patterns of elk within the North Fork Skokomish drainage based on marked animals or radio telemetry. Hence, descriptions of movement patterns are based on observations of individual elk or groups of elk, inferences from these observations, and studies of elk movements in other parts of the ONP and adjacent lands.

Houston et al. (1990) reported that the elk herds in the drainages on the east side of ONP were all migratory. Based on observations of elk during all seasons of the year, they concluded that the elk in the ONP east side drainages generally do not contain winter range for elk. They further concluded that elk are present in ONP only in the summer and autumn, as elk are forced out of the park by winter snows.

Douglas Bellingham, a former wildlife biologist of the Washington Department of Game, conducted an elk movement study in the South Fork Skokomish River area from February 1969, to February 1970. Two cow elk were captured on the winter range 15 miles southeast of the Staircase area, and fitted with radio transmitters. They spent the summer on USFS lands at the headwaters of Four Stream, three miles west of Staircase Ranger Station (Wrigley 1985). There is no information to suggest that these elk used the exchange lands.

Based on many years of personal observations of elk in the Staircase area, Bowen (pers. comm.) feels that there are two distinct bands of elk using the drainage. The first band moves down into the study area, including the exchange lands, in early to mid-November and continues its migration on to the south by crossing over the flanks of Mount Rose through Bear Gulch. This band of elk winters in the

Lilliwaup Swamp area outside the ONP and US Forest Service boundaries.

The second band stays in Slate Creek area (approximately 1 mile north of the ranger station) in late summer and early autumn, then moves down to the area around the ranger station and south to the ONP boundary in early winter. These are the winter resident elk. This band leaves the ONP periodically, feeding on the riparian areas and emergent wetlands on TPU land south along the upper end of the reservoir adjacent to ONP.

The winter resident elk in the Staircase area spend more time out of ONP during severe winters periods when deep snow accumulations occur. Wrigley (1985) reported total snowfall of 134 inches in the 1984-85 winter, with a maximum depth of 3.75 feet. Snow covered the ground from November 27, 1984 until April 16, 1985. During this period of high snow accumulations, Wrigley (1985) reported that the elk moved out of ONP, and spent much of the winter months along the lake, south of ONP towards Dry Creek.

The movement of elk from the ONP through the Staircase area to Lilliwaup Swamp was reported by WDW and ONP personnel in 1991. They observed a herd of 55 elk (with a large branch antlered bull) in the Finley Flats area of ONP in early November, and later observed a herd of 55 elk with a similar herd bull in the Lilliwaup Swamp (Schirato pers. comm., and Bowen pers. comm.). They concluded that this was the same herd, due to similar herd size and presence of the large branch-antlered bull.

The timing of migration through the area for the elk is variable from year to year. Bowen (pers. comm.) noted that in 1991 the migration was earlier than in past years.

4.3 Elk Habitat Use Patterns

Our understanding of elk habitat use patterns is based on general observations of elk in the area by park and WDW personnel, the 1984-85 winter study by Wrigley (1985), and other studies of elk in the Olympic Mountains.

General seasonal use patterns

The study area lands are primarily winter and transitional range for elk that migrate down the river corridor from the summer range in the ONP (Bowen pers. comm., Wrigley 1985). As noted above, the majority of the elk that move into the study area in late fall are transient elk that continue on to winter range as far as the Lilliwaup Swamp. A smaller number of elk remain in the drainage above Lake Cushman for the entire winter.

Studies of elk habitat use patterns in the Olympics noted that elk winter distribution is closely aligned to the valley lowlands, with the deciduous forest and mixed forest stands being most preferred (Jenkins and Starkey 1982, and Schroer 1986). On the winter range in the Hoh River valley, elk selected red alder, spruce-cottonwood, and spruce-hemlock forest stands (Jenkins and Starkey 1982).

The actual habitat use patterns in the study area in a given year depends on the severity of the winter, with specific regards to the amount of snow that accumulates. In a mild winter with minimal snow, the elk may spend almost the entire winter in the valley bottom areas within ONP and along the southern ONP boundary (including the exchange lands). Preferred foraging habitats are the valley bottom deciduous forest stands and the emergent wetlands at the head of the reservoir (the exchange lands and TPU lands outside of ONP) where forage is most abundant.

The old-growth conifer forests are secondary habitat, most likely used mainly as cover habitat, but some forage is also available for elk. The younger conifer stands are used for cover and bedding, and limited foraging during period of deep snow accumulations.

In the more severe winter of 1984-85, Wrigley (1985) noted the elk winter use area to extend from Staircase Rapids Bridge, located one mile above the Staircase Ranger Station, down to Dry Creek. He noted elk use of the Dry Creek area on several occasions, and considered that this was an exception, probably as a result of the severity of the winter.

Wrigley (1985) noted that the sedge meadow wetland areas on the North Fork delta in Lake Cushman were the most extensively used habitat by elk for foraging. He described a pattern of daily movement of elk from the conifer forests out onto these sedge areas for feeding. Most of his observations were of elk using or moving to or from the emergent wetland meadows in the reservoir area.

Elk use of TPU lands

TPU lands have been classified for elk cover types based on the WDW draft 1987 HSI model as part of the Cushman Hydroelectric Project FERC No. 460, based on the classification system of Witmer et al. (1985) (Figure 6). The valley bottom lands that are mixed (M-3) and deciduous (D-4) forest types are classified as "forage" areas. The younger conifer stands (C-3 and those with smaller dbh) are classified as "thermal cover," and the mature conifer stands (C-4) are classified as "optimal cover."

The emergent wetlands (PE) on TPU lands are seasonally inundated by the reservoir and were not mapped on Figure 6, as the mapping was based on aerial photographs taken during full pool reservoir conditions when these areas were inundated. The emergent wetlands should be included in the winter "forage" habitat area.

This classification of elk habitat cover types is consistent with reported patterns of elk use, with the exception of the "optimal cover" stands located on the north side of the reservoir. These latter stands are apparently used only as transitional habitat by the transient elk that move through the area on their way to winter range in the Lilliwaup Swamp area. These stands do not appear to be used as "optimal cover" stands, as elk mainly transit through these stands.

4.4 Elk Harvest Management

Elk in the portion of the study area outside of ONP are subject to various types of hunting seasons. Sport hunting seasons have been established by the Washington Department of Wildlife for all-citizen hunts. Other seasons have been established by the various Native American treaty tribes with hunting rights claims in the area.

Washington State elk seasons

The lands abutting the ONP within the North Fork of the Skokomish River drainage are contained in Game Management Units 636 - Skokomish (to the west of the river), and Unit 621 - Olympic (to the east of the river).

State hunting seasons are open to all elk hunters with a Western Washington tag (type W). The 1991 modern firearm seasons were November 6 to 17 for early tags, and November 9 to 17 for late tags. The archery season in GMU 621 was from September 28 to October 11. The archery season in GMU 636 went from November 27 to December 15. There was a muzzleloader elk season in GMU 636 from October 5 to 11.

Hunting for all seasons was limited to bull elk with minimum three-point antler restrictions.

Elk harvests in State seasons

Information on elk harvests specifically within the study area is limited to the log entries by ONP staff. Elk harvest data on file with WDW is limited to the results of hunter report cards and hunter surveys. The WDW does not routinely obtain or record locations of elk harvests within a particular portion of a GMU, except in special circumstances.

Bowen (pers. comm.) reports that elk hunters congregate at the southern boundary of the park in the Staircase area and wait for the elk to move out of the ONP. Elk are regularly harvested in the lands boundaring ONP.

Hunters occasionally trespass into ONP, and hunters have illegally killed elk within the boundaries of ONP (see Appendix B, ONP log notes).

Tribal Elk Hunting Seasons

There are several native American tribes that hunt the elk populations along the east and southeast boundaries of the ONP. Specific information on tribal regulations and elk harvests by the tribes is not available. It is reported that current tribal regulations limit some tribal harvests to bull elk, while others tribes still allow cows to be harvested. In past years, cows have been legal animals in much of this area for several of the tribes.

The legal issue of native American tribal hunting rights within the ONP has not been settled (Houston et al. 1990, citing Weinberg 1984 and Holt 1986).

4.5 Factors Limiting the Study Area Elk Population

Houston et al. (1990) noted that "virtually all ONP elk in east- and south-side drainages appear to winter beyond the park boundaries and may be maintained at, or perhaps below, economic carrying capacity (Kc) by human harvests..." And, in at least one case, the Dosewallips, elk harvests under state and tribal regulations have nearly eliminated the elk herd (Raedeke in prep.).

The two sub-populations of elk that use the study area are subject to very different morality and habitat factors as a result of their distribution and movement patterns. Consequently, the factors limiting the populations also differ.

Resident winter elk limiting factors

The available information on mortality factors and dynamics of the elk sub-population that winters in the Staircase area would suggest that the quality and quantity of the winter range is currently the factor most responsible for regulation of the elk numbers. The role of tribal elk harvests and illegal harvests of antlerless elk is not known, but may be an important factor (Raedeke and Taber 1980).

The role of predation in limiting elk numbers is not known, but is assumed to be minimal, as the mountain lion is the only large predator remaining in the area. There are no accounts of recent mountain lion kills in the area.

As noted previously, State hunting seasons are limited to branch-antlered bulls, and such seasons could limit a elk population only if the hunters reduced the number of bulls to a level that resulted in an insufficient number of bulls to service all the cows.

Available information on herd composition indicates that bulls are not in limited supply. Wrigley (1985) noted two large (branch antlered) bulls, four spike bulls, and 13 antlerless elk (including cows and calves) on January 25, 1985. Using his summary count of the antlerless elk as including five calves, this would leave eight cows, and give a bull:cow ratio of 6:8. This bull:cow ratio is higher than ratios reported in any hunted or unhunted elk population in Washington (Spencer and Raedeke 1991). Bull:cow ratios in heavily hunted, yet viable, elk populations have been reported as low as eight bulls per 100 cows (Merrill et al. 1986, Taber et al. 1982, Taber and Raedeke 1987).

These limited data also indicate very high productivity, as measured by the number of calves per adult cows. The ratio of 5 calves per 8 cows is very high. This would indicate either an increasing elk herd or very high annual turn-over rates. Both of these characteristics would be inconsistent with the hypothesis of a herd at carrying capacity, currently limited by forage resources. The former could be a short-term response to improved environmental conditions, or recovery of the population after a population crash. In any case, additional data and study would be required to more fully assess the dynamics of the population.

The effect of hunting on the sub-population of resident winter elk is further limited by movement patterns of the elk. In many years the elk apparently remain in the park during the entire autumn and early winter months (i.e., the hunting season), or even the entire winter. As noted in the ranger daily observation logs, and in Wrigley (1985), these elk leave ONP mainly in response to severe winter snow conditions.

We cannot assess the role of Tribal hunting in population regulation as harvest information from Tribal seasons is not available. There is conflicting information regarding elk harvests in this area by tribal hunters. Some sources report that tribal hunters harvest elk in the Staircase area adjacent to ONP, while others report that tribal hunters seldom or never harvest elk from this area.

Some harvest of antlerless elk could occur without a reduction in the size of the elk population as hunting mortality replaces other forms of mortality (see Taber et al. 1982, Taber and Raedeke 1979 and 1987, and Boyce 1989). Further, the elk population could sustain various harvest levels without a change in the total population size.

For example, Boyce (1989) modeled sustained yields in the Jackson elk population, and from empirical data calculated a maximum sustained yield (MSY) of 48% (3,387 elk) of the total population of 7,100 elk, at 48% of carrying capacity (K) of 11,225 elk. However, MSY in the Olympic elk populations would likely be lower, due to lower reproductive rates for Roosevelt elk.

The hypothesis that quality and quantity of habitat available to elk is the ultimate factor limiting this elk sub-population is supported by the periodic observations of elk dying of apparent winter starvation within the study area (see ONP log notes, Appendix B for 1963, 1964, and Wrigley 1985).

Transient elk limiting factors

Unlike the elk that winter in the study area, the transient elk regularly move into areas open to public hunting. The lands occupied by these elk, once they leave ONP, are generally open to public and tribal hunting. The elk are vulnerable to hunters during State and tribal seasons for a number of weeks, or even several months each year, depending on when they leave ONP. The limited herd composition data show reduced bull:cow ratios, but not to the point that breeding is impaired.

While the established bull elk seasons cannot limit elk population growth, tribal harvests of antlerless elk, poaching and crippling losses could be a significant factor. However, at this time we have no information to use in assessing such hunting impacts. State and tribal harvests have effectively limited at least one other Olympic elk population (see Raedeke in prep.).

Habitat quality outside ONP is also an issue, especially with regards to habitat free from harassment. The Department of Natural Resources and WDW are cooperating in the establishment of an effective road management area, called the Price Lake/Lilliwaup Swamp area, intended to reduce harassment of elk. The principal objective of this road management area is to reduce disturbance and harassment of elk during the critical winter period by preventing vehicle access to road closure area (Dept. Natural Resources 1991).

5.0 IMPACTS OF LAND EXCHANGE ON ELK AND ELK HABITAT

The exchange lands provide important habitat for the winter resident elk in the Staircase area, but are less important for the transient elk which make up the bulk of the population that use the drainage.

The exchange lands are a central part of the home range of the elk that are winter residents in the North Fork of the Skokomish River above Lake Cushman. The area provides a near optimum mix of forage and cover for elk. The elk use the emergent wetlands within the boundaries of the reservoir (both in ONP and on TPU lands) as a key foraging area, and the adjacent deciduous forest stands for both cover and feeding. The conifer forests in the valley serve as elk hiding cover habitat, and the old-growth forest stands provide forage and cover during moderate snow conditions.

The winter resident elk appear to be limited by the quality and quantity of this winter range. However, protection from hunters afforded by ONP allows the elk greater use of the area as they become more habituated to human activity.

The exchange lands are less important for transient elk in the drainage. These elk may use these lands for a short period of time in the fall or early winter, but move onto other range areas for the critical months of the winter. The protection afforded by ONP may also be of less importance, as these elk are often already outside of ONP during state and tribal hunting seasons.

The impact on elk resulting from the proposed transfer of the exchange lands from ONP to TPU will depend on two factors:

- the land management program of TPU for the exchange lands, and
- the change in vulnerability of elk to hunting mortality on these exchange lands.

Both of these factors could be altered as a result of the change in ownership of the exchange lands, either directly, or indirectly.

Land Management by TPU

The exchange lands are recognized as being of high habitat value for elk, with little potential for habitat enhancement or management over existing conditions. The existing old-growth conifer forests, and mixed conifer-broad leaf deciduous riparian forest offer near optimal conditions for elk, with little opportunity for improvement of elk habitat.

In order to maintain the habitat quality for elk, the exchange lands should be retained by TPU in their existing condition. It will be important to retain not only the forest stands, but also the emergent wetland meadows that are the result of periodic inundation by the reservoir. The meadows are undoubtedly an important factor in the quality of elk habitat in the area.

Altered water levels in the reservoir will reduce habitat carrying capacity for the elk. Lowered reservoir water levels will allow invasion by woody species, and result in reduced elk forage production. Higher reservoir water levels will also reduce forage biomass production of the meadows due to reduced growing season with increased inundation (Raedeke Associates Inc. 1991).

Elk Hunting Management

If the exchange lands are transfered out of the jurisdiction of the US Park Service, the lands will be open to hunting under State regulations, and possibly tribal regulations, unless some action is taken to effectively restrict hunting.

Depending on what hunting seasons are established for the area, the impacts of this change could be substantial. Elk in the area would be quite vulnerable to hunters for a number of years until the selection process makes them aware of the new boundaries.

As noted previously, the current hunting seasons that limit the kill to branch-antlered bulls will not regulate the elk population. However, the disruption of the elk's daily patterns associated with hunting in the area would reduce the value of this area for the elk.

A change to cow seasons by either the State or Tribes could rapidly reduce the size of this elk herd, or elimiante it althogether.

6.0 POTENTIAL MITIGATION MEASURES

The primary focus of mitigation for the impacts of the land exchange on elk should be to provide continued protection of the elk from hunting in order to maintain current elk population status. As discussed above, habitat enhancement does not appear to be a reasonable mitigation measure for the exchange lands.

Measures that should be considered are:

- Request the State Wildlife Commission to close the exchange lands to all hunting under State regulation,
- The area be closed to trespass by hunters through extensive posting of the boundary, and,
- Negotiate closure of the exchange lands with the various Native American Tribes that hunt in the drainage.

7.0 LITERATURE CITED

Boyce, M. 1989. The Jackson elk herd. Cambridge University Press, New York. 306 pp.

Department of Natural Resources. 1991. Project Proposal: Price's Lake/Lilliwaup Swamp Road Management. Proposal to Rocky Mountain Elk Foundation. 3 pp.

Henderson, J., D. Peter, R. Lesher, and D. Shaw. 1989. Forested plant associations of the Olympic National Forest. USDA Forest Service, R6 ECOL Tech. Paper 001-88. 503 pp.

Holt, H. 1986. Can Indians hunt in national parks? Environmental Law 16:207-254.

Houston, D., E. Schreiner, B. Moorhead, and K. Krueger. 1990. Elk in Olympic National Park: Will they persist over time. Natural Areas Journal 10(1):5-11.

Jenkins, K., and E. Starkey. 1984. Habitat use by Roosevelt elk in unmanaged forests of the Hoh Valley, Washington. J. Wildl. Manage. 48(2):642-646.

Jenkins, K. and E. Starkey. 1982. Social organization of Roosevelt elk in an old-growth forest. J. Mammal. 63:331-334.

Merrill, E., K. Raedeke, K. Knutson, and R. Taber. 1986. Elk recolonization and population dynamics in the northwest portion of the Mount St. Helens Blast Zone. pp. 359-368. _In_ Keller, S. (ed.). Mount Saint Helens: 5 years later. Eastern Wash. Univ. Press, Cheney, Wash. 442 pp.

Merrill, E., and K. Raedeke. 1988. Forest Succession and elk harvest strategies at Mt. St. Helens. pp. 198-202. _In_ Proceed. Western States and Provinces Elk Workshop, Wenatchee, WA. 249 pp.

Paige, D. 1988. Factors affecting the population structure and dynamics of Rocky Mountain elk (_Cervus elaphus nelsoni_) in the Cedar River Watershed, Washington. Doctoral Dissertation, Univ. of Washington, Seattle. 159 pp.

Paige, D., K. Raedeke, and R. Taber. 1990. Biology of a colonizing, unharvested population of elk (_Cervus elaphus_) in western Washington. International Biology of Deer Symposium. Abstracts No. 4. Mississippi State University.

Raedeke, K. 1990. Integrating deer and timber management. Perspectives on Economics and the Environment 4(2):8-9.

Raedeke, K. (in prep). Dynamics of the Dosewallips elk herd, with special reference to winter cover.

Raedeke, K., and R. Taber. 1982. Mechanisms of population regulation in western Washington forests for Cervus and Odocoileous. Trans. Internal. Congress Game Biologists 14:69-79.

Raedeke, K., and D. Paige. 1987. Elk populations in the Cedar River Watershed. Final Report to Seattle Water Department. College of Forest Resources, Univ. of Washington, Seattle, Washington. 53 pp.

Raedeke Associates, Inc. 1991. Status of wetlands in the Chester Morse Lake system: Preliminary monitoring results 1987-1991. Report to Seattle Water Department, Seattle.

Schroer, G. 1987. Seasonal movements and distribution of migratory Roosevelt elk in the Olympic Mountains, Washington. M.S. thesis, Oregon State Univ. 86 pp.

Schroer, G. 1988. Seasonal movements, distribution, and habitat use by Roosevelt elk in the lower Queets River valley, Olympic National Park. Unpubl. Rpt. to Div. Nat. Sci. Studies, Olympic National Park, Port Angles, WA. 72 pp.

Schroer, G., G. Witmer, and E. Starkey. 1988. Effects of land use practices on Roosevelt elk winter ranges, western Washington and Oregon. pp. 68 - 75. In Western States and Prov. Elk Workshop, Wenatchee, WA.

Spencer, R., and K. Raedeke. 1991. White River elk management plan. Unpublished report.

Taber, R., and K. Raedeke. 1980. Roosevelt elk of the Olympic National Forest. Unpubl. report. College of Forest Resources, Univ. of Wash., Seattle. 107 pp.

Taber, R. and K. Raedeke. 1979. Population dynamics. pp. 98-106, In Teague, R. D. and E. Decker (eds.). Wildlife Conservation. The Wildlife Society, Washington D.C. 280 pp.

Taber, R., D. Manuwal, S. West, K. Raedeke, and D. de Calesta. 1981. Wildlife management in the mesic-temperate forest of Washington and Oregon. pp. 575-587, Proc. Div. I, XVII IUFRO World Congress, Kyoto, Japan.

Taber, R., K. Raedeke, and D. McCaughran. 1982. Chapter 6. Population Characteristics. pp. 279-298. In McCabe, D. (ed.). The Elk of North America. The Wildlife Management Institute, Washington D.C.

Taber, R. and K. Raedeke. 1987. The Management of Cervus in North America. pp. 568-577. In Wemmer, C. (ed.). Biology and management of Cervidae. Smithsonian Institution Press. Wash. DC. 577 pp.

Weinberg, J. 1984. Report and recommendation on motion to dismiss. Case No. C.R.82-332 M, U.S. District Court, Western District of Washington, Seattle, Wash. 10 pp.

Witmer, G. et al. 1985. Deer and elk. Chpt. 11. In Brown, E. (ed.). Management of wildlife and fish habitats in forests of Western Oregon and Washington. USDA Forest Service Pub. No. R6-F&WL-192-1985. Portland, OR. 332 pp.

Wrigley, M. 1985. Roosevelt elk of the Staircase Area. Unpubl. report, Olympic National Park. 24 pp.

Vegetative Cover Types in the Vicinity of the TPU Boundary

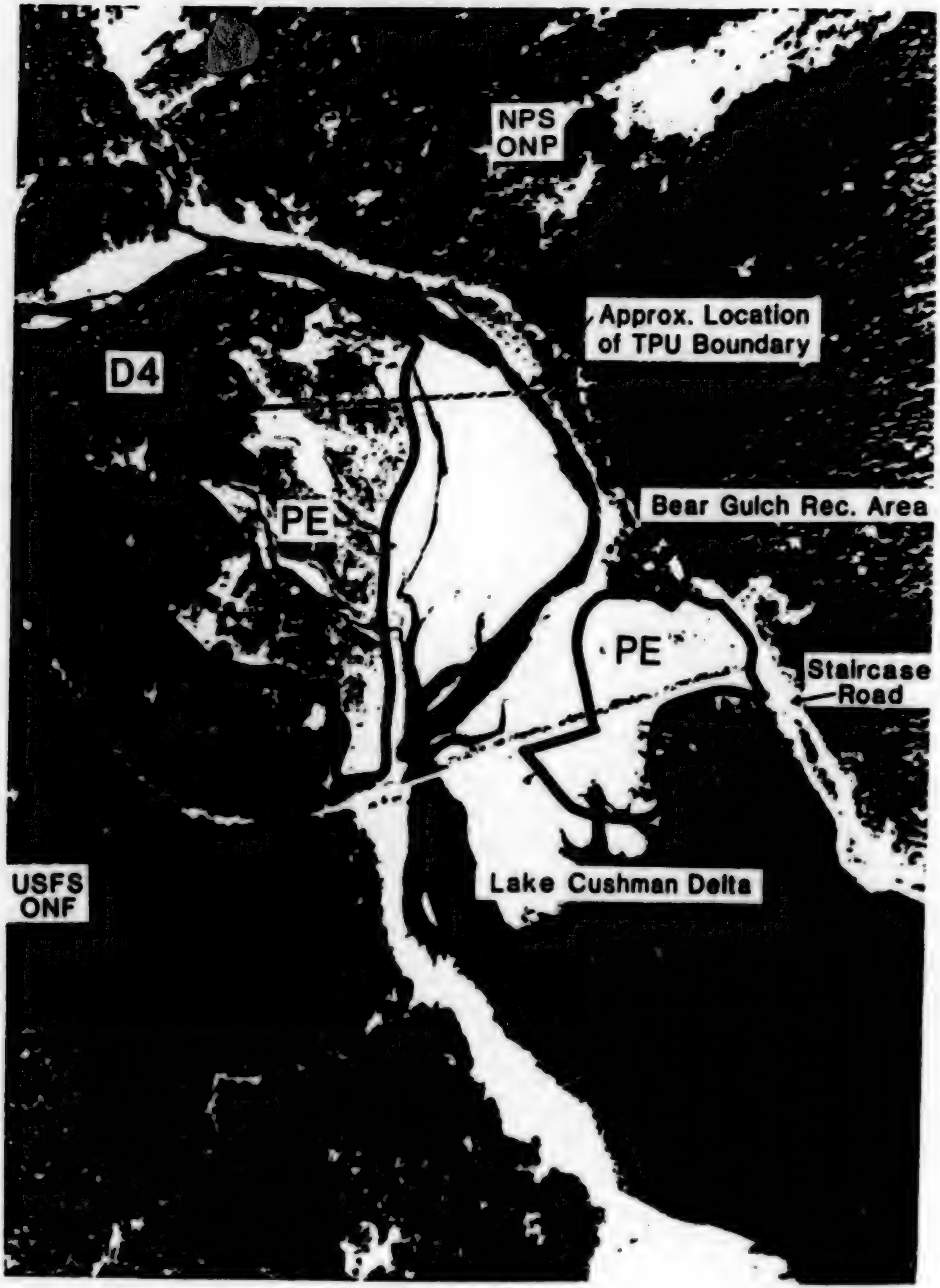


Exhibit 15

Appendix A. Scope of Services

June 27, 1991

Ms. Pamela Klatt
Harza Northwest, Inc.
2353 - 130th Avenue N.E., Suite 200
Bellevue, Washington 98005

Re: Revised Scope of Environmental Assessment
Cushman Reservoir Land Exchange
Elk habitat

Dear Ms. Klatt:

In response to discussions with Olympic National Park personnel in the field on June 20, 1991, and Mr. Bruce Moorhead's comments (letter dated June 24, 1991), I have prepared this revised scope for the environmental assessment of the potential impacts on the elk herd that are likely to result from the proposed land exchange between the Olympic National Park and the City of Tacoma.

Based on the above mentioned conversations, it is still my understanding that the Park's primary concern is the long-term well being of the elk herd that seasonally occupies parts of the area that would be transferred from the Olympic National Park to the City of Tacoma. Specifically, the assessment will address how the status of this herd would be affected by the proposed change in land ownership.

It is also my understanding that assessment of the impacts of the Cushman Reservoir on elk and elk habitat in the area are not to be part of this assessment.

To address the Park's concerns, as defined above and as expanded in Mr. Moorhead's letter and our site visit, I would attempt to determine the following:

1. Seasonal habitat use patterns of the elk that use the proposed exchange lands.

2. Habitat use patterns of this herd outside of the Park lands.

RAEDEKE ASSOCIATES SCIENTIFIC CONSULTING
5711 Northeast 63rd St Seattle, WA 98115 (206) 525-8122

3. Relative importance of the exchange lands to the long-term well-being of the herd.

4. Other factors affecting the well-being of this herd, including land management outside of the Park, hunting, recreational impacts, etc.

5. Long-term trends in the habitat within the range of these elk.

6. Current and potential elk winter habitat along the south margin of Lake Cushman to Dry Creek.

I would attempt to conduct the EA through a brief site visit and review of the existing information on the elk. Specifically, the assessment would be based on the following sources of information:

* a description of the elk habitat in the exchange lands based on field reconnaissance and air photo interpretation,

* a review of any existing elk studies and/or elk habitat mappings for the area or region,

* compilation of observations of elk by local residents, state wildlife biologists and park personnel,

* a review of the current habitat status of project lands, and adjacent potential mitigation lands,

* a review of published elk habitat models, and

* a review of current and potential elk management regulations for the area, including mitigation lands.

Original field research, other than the reconnaissance level description of habitat conditions, is not proposed as part of this environmental assessment.

I would appreciate the review of the above revised scope of work by you, the City of Tacoma, and the Olympic National Park, and written comments regarding any expansion or change in the scope of issues to be addressed.

I look forward to working with you and the National Park Service staff on this project.

Sincerely,

Kenneth J. Raedeke, PhD
Wildlife Biologist

attachment

cc: John Aho, Olympic National Park

1991:91058sc2

United States Department of the Interior

NATIONAL PARK SERVICE

OLYMPIC NATIONAL PARK
600 East Park Avenue
Port Angeles, Washington 98362-6798

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
L7619 (OLYM)

REC[illegible]
2
RA[illegible]

July 1, 1991

HARZA Northwest, Inc.
Ms. Pamela Klatt
2353 130th Avenue N.E. - Suite 200
Bellevue, Washington 98005

Dear Ms. Klatt:

This letter conveys my acceptance of the revised scope of study, described in a letter dated June 27, 1991 from Dr. Ken Raedeke to you, regarding elk use of lands at the head of Lake Cushman.

The information to be derived will be relevant to an assessment of the effects of the proposed boundary adjustment/land exchange upon the elk that use this area seasonally.

We are hopeful that the information will lead to a cooperative management strategy that ensures the long-term well being of Roosevelt elk in this area.

Sincerely,

(Sgd.) MAUREEN FINNERTY

Maureen Finnerty
Superintendent

cc:
✓ Dr. Ken Raedeke
George Bowen
Bruce Moorhead
Ron Hyra

Appendix B. Summary of Olympic Park Log Notes

Here's the Fax

Date: 10-28-91

From: Sale Graham ONP

Hood Canal Ranger District

To: Ken Raedeke

Hood Canal Ranger District FAX Number: (206) 877-5387

Phone Number (206) 877-5254

Pages in Transmission, Cover page plus 3

Comments:

HISTORICAL ELK SIGHTINGS IN THE STAIRCASE AREA
AS TAKEN FROM STAIRCASE LOG

1958 NOV AND DEC NO MENTION OF ELK IN LOG BOOK

1959

OCT ONLY REFERENCE TO ELK IN 1959--I HAVE BEEN INFORMED I WILL BE ON THE QUEETS AGAIN THIS FALL FOR ELK SEASON. I HOPE PLANS WILL BE MADE SO THAT AN EFFECTIVE PATROL CAN BE CARRIED OUT ON THE EAST SIDE, ESPECIALLY THE STAIRCASE AND S.F. SKOKOMISH AREAS.

1960

MAY OBSERVED TWO BULL ELK STILL IN THE VELVET A SHORT DISTANCE BELOW CAMP PLEASANT.

JUNE DEER AND ELK SEEM TO BE MORE ABUNDANT IN THE STAIRCASE AREA THIS YEAR SEVERAL PARTIES HAVE REPORTED SEEING ELK IN THE VICINITY.

1961

MAY ELK SEEN AT BEAR FLAT.

ELK HAVE BEEN SEEN ON THE FLAT ABOVE STAIRCASE RANGER STATION THIS SPRING.

NOV BEGINNING OF ELK SEASON, 80 ELK NEAR STAIRCASE BOUNDARY. 25 OR 30 MOVED OUT OF PARK AT NOON AND WERE SHOT UP BY HUNTERS. 5 BULLS AND 2 COWS (ILLEGAL).

1962

OCT TO DATE THERE HAS BEEN NO SIGN OF ELK.

NOV 16 PATROL OF BOUNDARY AND SHADY LANE TRAIL AREA. NO SIGN OF ELK AS YET. VERY FEW HUNTERS

NOV 30 ELK ABOVE SLATE CREEK.

ON 17 NOVEMBER I OBSEVED A SMALL HERD OF ELK (ABOUT 15 HEAD-2BULLS) FEEDING ON THE FLATS ALONG THE RIVER ABOVE SLATE CREEK. SUBSEQUENT OBSERVERS COUNTED AS MANY AS 30 ELK IN THIS HERD. APPARENTLY THIS GROUP NEVER REACHED AN AREA OPEN TO HUNTERS THIS YEAR.

THERE WERE MANY (MOST TO DATE) HUNTERS IN THE AREA. TWO TOLD ME THEY KNEW OF 3 ELK THAT WERE TAKEN AT, OR NEAR, THE UPPER END OF THE USFS ACCESS ROAD FRIDAY 16 NOV.

1963

JULY RUSSELL AND YOST REPORTED SEEING 5 BEAR AND 4 ELK ON THEIR PATROL TO HAGAN LAKE.

AUG A LARGE HERD OF ELK (100-150) WERE REPORTED BY A PARK VISITOR IN THE O'NEIL PASS AREA.

SEPT VISITORS REPORTED A LARGE HERD OF ELK ON SIX RIDGE BELOW BELVIEW SHELTER.

OCT NO ELK HAVE BEEN SEEN TO DATE.

NOV 17 ELK (8 BULLS) WERE SIGHTED IN THE BIG LOG AREA ON NOV. 8. OVER 100 ELK WITH 16 BULLS WERE SEEN BY THE APW CREW IN THE FINLEY FLAT AREA ON NOV.11

11-9-63 9 ELK(2 BULLS) SIGHTED ABOVE STAIRCASE RAPIDS. OTHERS SEEN ALONG PARK BOUNDARY AT HEAD OF LAKE.

11-13-63 100+ ELK (16 BULLS) SIGHTED AT FINLEY FLAT THIS AFTERNOON.

AS FAR AS KNOWN, NO ELK WERE SHOT ALONG THE PARK BOUNDARY THIS SEASON.

THE APW CREW REPORTED A WOUNDED COW ELK ON THE RIVER BOTTOM ABOUT A HALF MILE BELOW STAIRCASE ON NOV. 13. DARKNESS FELL BEFORE THE ANIMAL WAS FOUND. TWO DAYS LATER HER CARCASS WAS OBSERVED ON A SAND BAR IN THE MIDDLE OF THE SKOKOMISH, JUST INSIDE THE PARK BOUNDARY. ALTHOUGH A THOROUGH INVESTIGATION WAS NOT POSSIBLE, IT IS BELIEVED THAT THIS ANIMAL DIED OF NATURAL CAUSES, SINCE NOT BLOOD COULD BE FOUND WHERE SHE WAS FIRST OBSERVED, NO HUNTERS WERE BELIEVED IN THE AREA, AND NO SHOTS WERE HEARD.

11-17-63 ONE BULL, FOUR COWS SIGHTED ON SO. SIDE MT.ROSE.

DEC OCCASIONAL ELK SIGN IS SEEN IN THE VALLEY ALONG THE RANGER STATION, ALTHOUGH NO ANIMALS HAVE BEEN OBSERVED.

1964

JAN HERDS OF ELK RANGING FROM 4 TO 20 HEAD HAVE BEEN OBSERVED ON SEVERAL OCCASIONS IN THE RIVER BOTTOM BETWEEN STAIRCASE AND THE PARK BOUNDARY.

FEB THERE HAS BEEN A NOTICEABLE ABSENCE OF ELK AND DEER IN THE AREA SINCE LAST MONTH'S SNOW.

MAR A DEAD, THREE-POINT, BULL ELK WAS FOUND 1/2 MILE ABOVE STAIRCASE, ON THE SKOKOMISH ROAD, MAR. 19. IT WAS AN APPARENT WINTER KILL.

APR SMALL HERDS OF ELK WERE SEEN THROUGHOUT THE MONTH ALONG THE NORTH FORK OF THE SKOKOMISH BETWEEN THE RANGER STATION AND THE PARK BOUNDARY.

MAY FIVE ELK WERE SEEN IN THE FINLEY FLAT AREA ON MAY 16.

NOV CONSIDERABLE TIME WAS SPENT DURING THE PERIOD NOV. 7-15 ON BOUNDARY AND ELK HUNTER PATROLS. ACTIVITY WAS THE HEAVIEST IN THE DUCKABUSH DRAINAGE. IN THE NORTH FORK SKOKOMISH AND DOSEWALLIPS VALLEYS ELK HERDS STAYED SEVERAL MILES INSIDE THE PARK AND WERE NOT BOTHERED BY HUNTERS.

11-6-91 LONE BULL ELK SPOTTED AT FINLEY FLAT.

THE REMAINS OF TWO BULL ELK, SHOT BY HUNTERS WERE FOUND WITHIN THE PARK BOUNDARY ON NOV. 15(SEE REPORT DATED NOV.21). THE HIDES AND ENTRAILS OF 2 BULLS WERE ABOUT 200-300' INSIDE THE BOUNDARY AND ABOUT 200' FROM THE RIVER. NO BOUNDARY TAGS WERE FOUND ON THAT SIDE OF RIVER.

1965

MAY VISITOR REPORTED INJURED ELK NEAR MT. ROSE TRAIL. CONTACTED FRED HOLM, ST. GAME DEPT., WHO CAME UP AND SHOT IT. 5-28-65

1966

JUNE 6-1-66 SAW 35 ELK 1 MILE THIS SIDE OF 9 STR. TRAIL.

NOV 11-6-66 TRAIL PATOL TO CAMP PLEASANT LOOKING FOR ELK SIGN. SAW A FEW TRACKS, BUT NO ANIMALS.
11-17-66 THREE ELK AT FINLEY FLAT.
11-21-66 40 ELK (4-5 BULLS) DOWN AT THE HEAD OF LAKE CUSHMAN THIS A.M.

1968

NOV 11-2-68 2 BULLS TAKEN UP 4-STREAM WELL AWAY FROM PARK.
11-10-68 VISITOR REPORTED ELK IN FLATS OPPOSITE 4-STREAM.
11-17-68 ELK JUST INSIDE PARK AND GIVING AREA HUNTERS ITCHY TRIGGER FINGERS.

1969
SEPT 9-28-69 SAW SINGLE LARGE BULL ELK ABOUT 1/8 MILE FROM RANGER STATION UP
NORTH FORK ROAD THIS A.M. EXCELLENT SHAPE AND A FULL RACK.
11-9-69 ONE ELK TRACK SPOTTED NEAR 4-STREAM CROSSING ON SKOK.
11-15-69 ELK SITED THIS MONDAY BY TOURIST-BRIDGE JUST OUTSIDE OF BOUNDARY.

1970
OCT 10-28-70 ELK DOWN ON FOUR STREAM ROAD.

1971
JUNE 6-12-71 FOUR ELK SPOTTED AT 4 STREAM.
6-19-71 ELK SITED ON ROAD TO FLAPJACKS
NOV 11-25-71 SIGHTED SIX ELK UP NEAR 4-STREAM.

1972
NOV 11-4-72 SNOOPING HUNTER JUMPED HERD OF 50 ELK ABOVE SLATE CREEK.

1973
JAN 1-18-73 ON WAY TO STAIRCASE SPOTTED BAND OF ELK JUST ABOVE STATE PARK.
MARCH 3-7-73 LOCALS FROM YESTERDAY CHASED COW ELK ACROSS RIVER NEAR BOUNDARY.

1975
NOV 11-15-75 ELK HUNTERS KEEP PRESSURING THE BOUNDARY.

END OF LOG 2-21-76

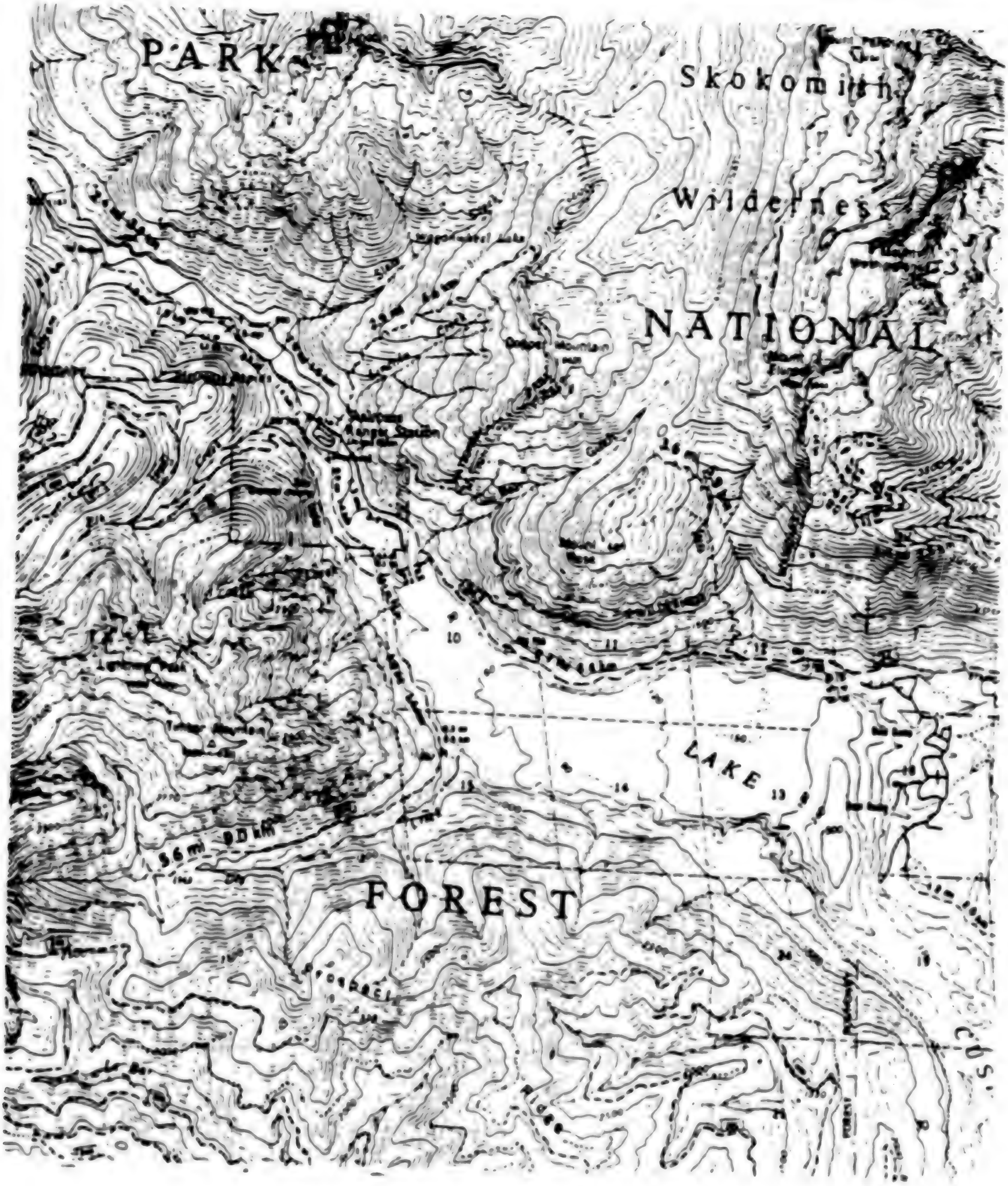


Figure 1. Location of the study area on the Olympic Peninsula, Washington.

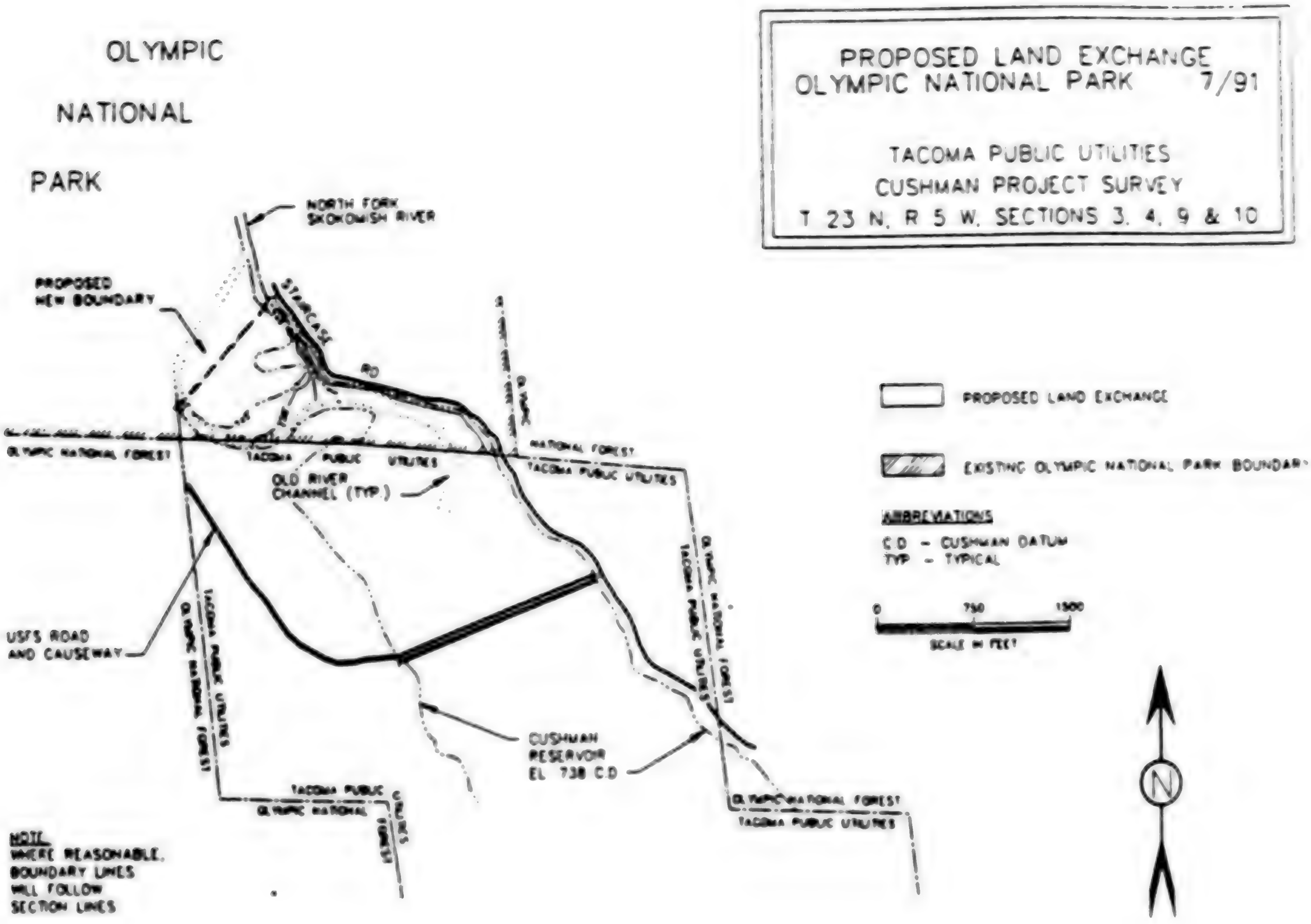


Figure 2. Location and designation of the proposed exchange lands.

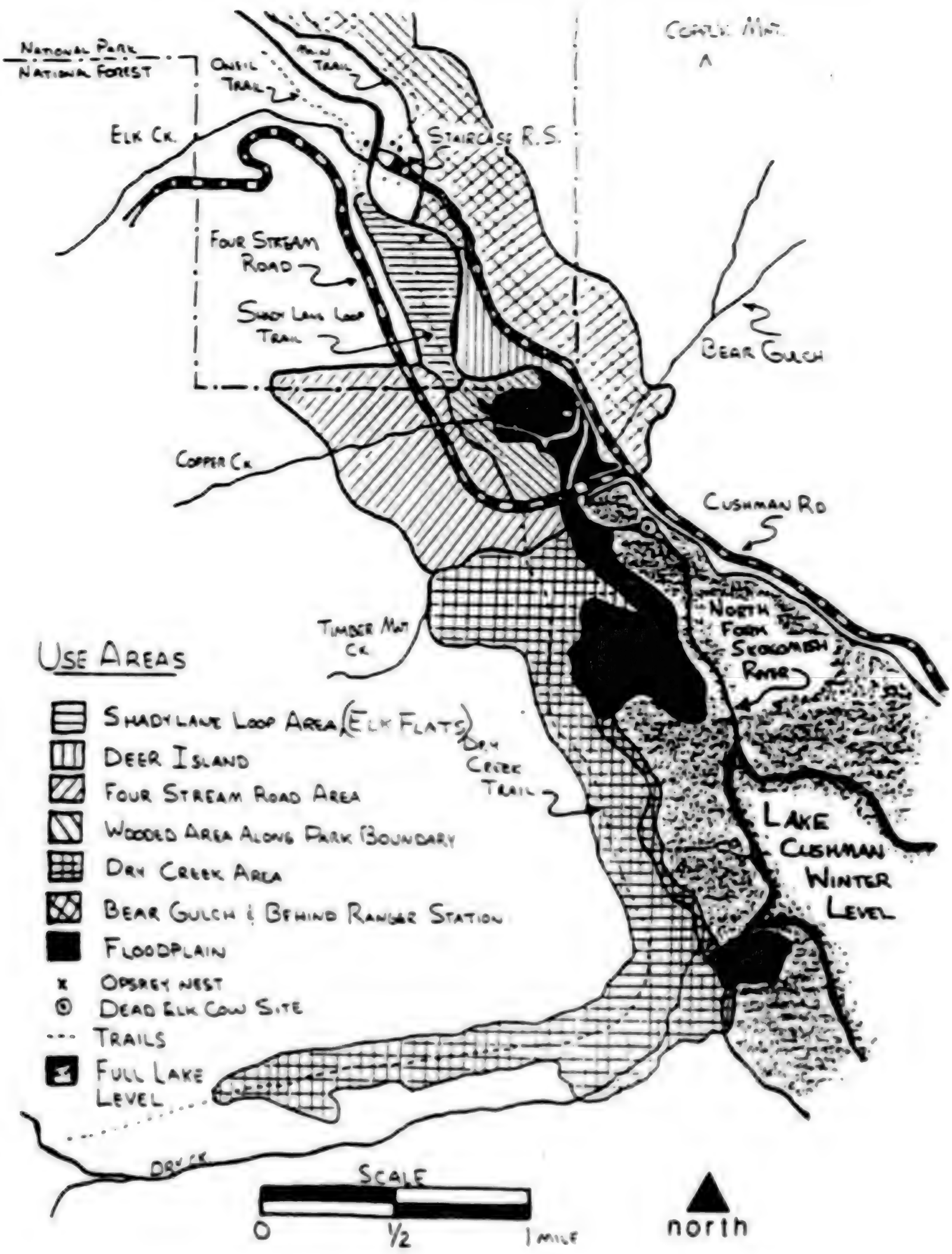


Figure 3. Vegetation cover types in the study area as drawn by Wrigley (1985).

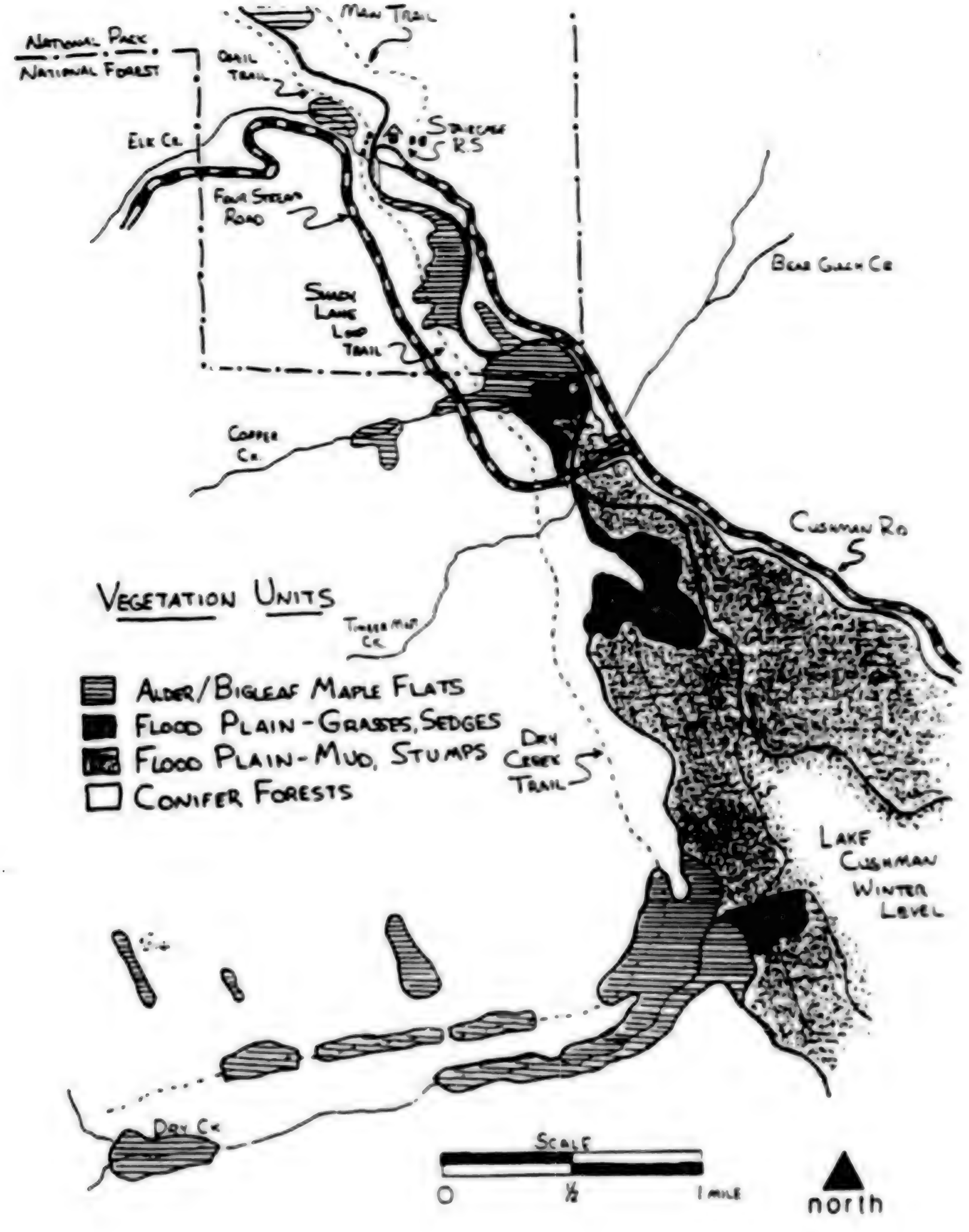
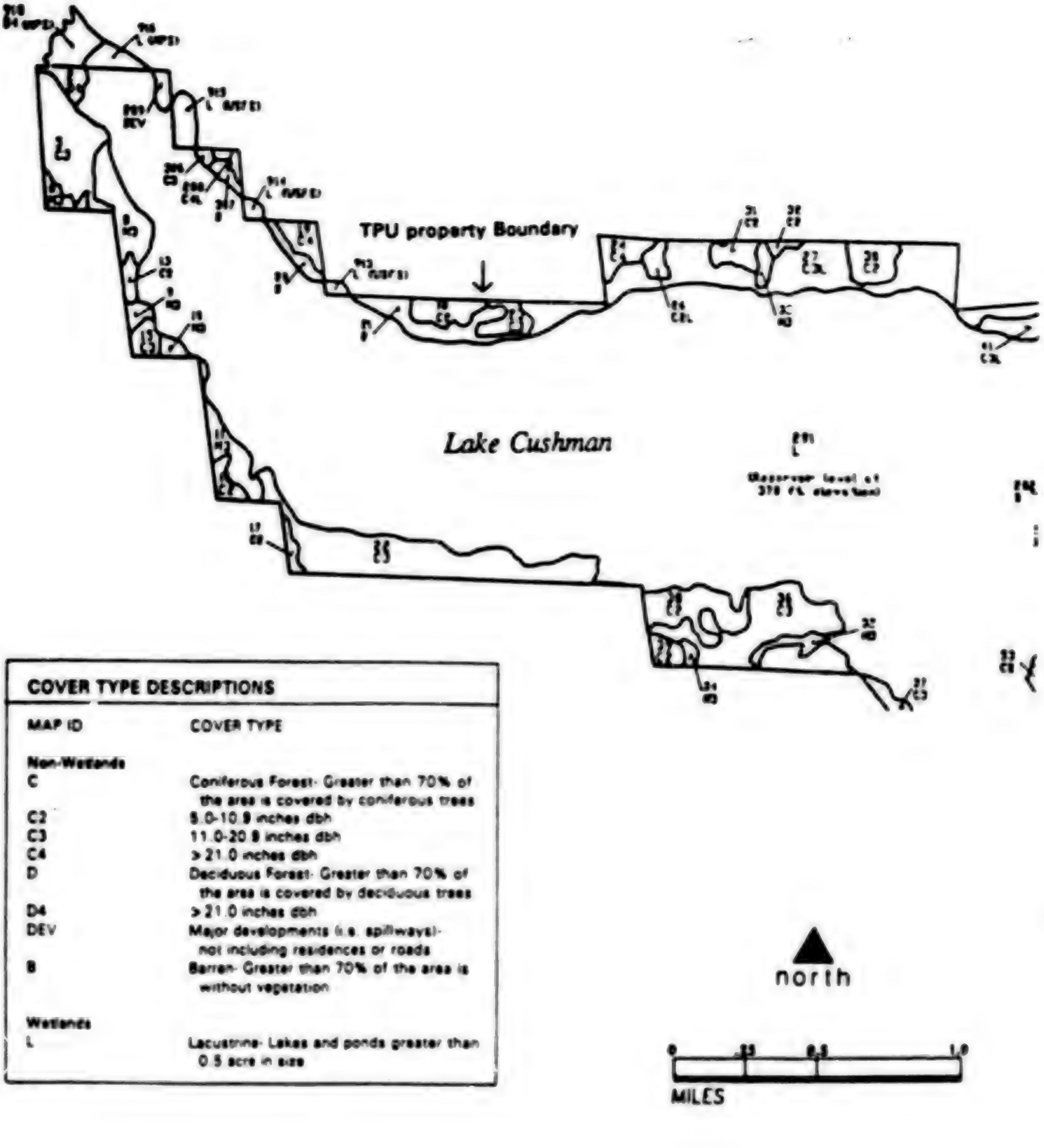


Figure 4. Elk winter range use areas within the study area as drawn by Wrigley (1985).



COVER TYPE DESCRIPTIONS

MAP ID	COVER TYPE
Non-Wetlands	
C	Coniferous Forest- Greater than 70% of the area is covered by coniferous trees
C2	5.0-10.9 inches dbh
C3	11.0-20.9 inches dbh
C4	> 21.0 inches dbh
D	Deciduous Forest- Greater than 70% of the area is covered by deciduous trees
D4	> 21.0 inches dbh
DEV	Major developments (i.e. spillways)- not including residences or roads
B	Barren- Greater than 70% of the area is without vegetation
Wetlands	
L	Lacustrine- Lakes and ponds greater than 0.5 acre in size

Figure 5. Plant cover type mapping for the study area by Hosey & Associates, developed for the Cushman Hydroelectric Project (FERC No. 460).

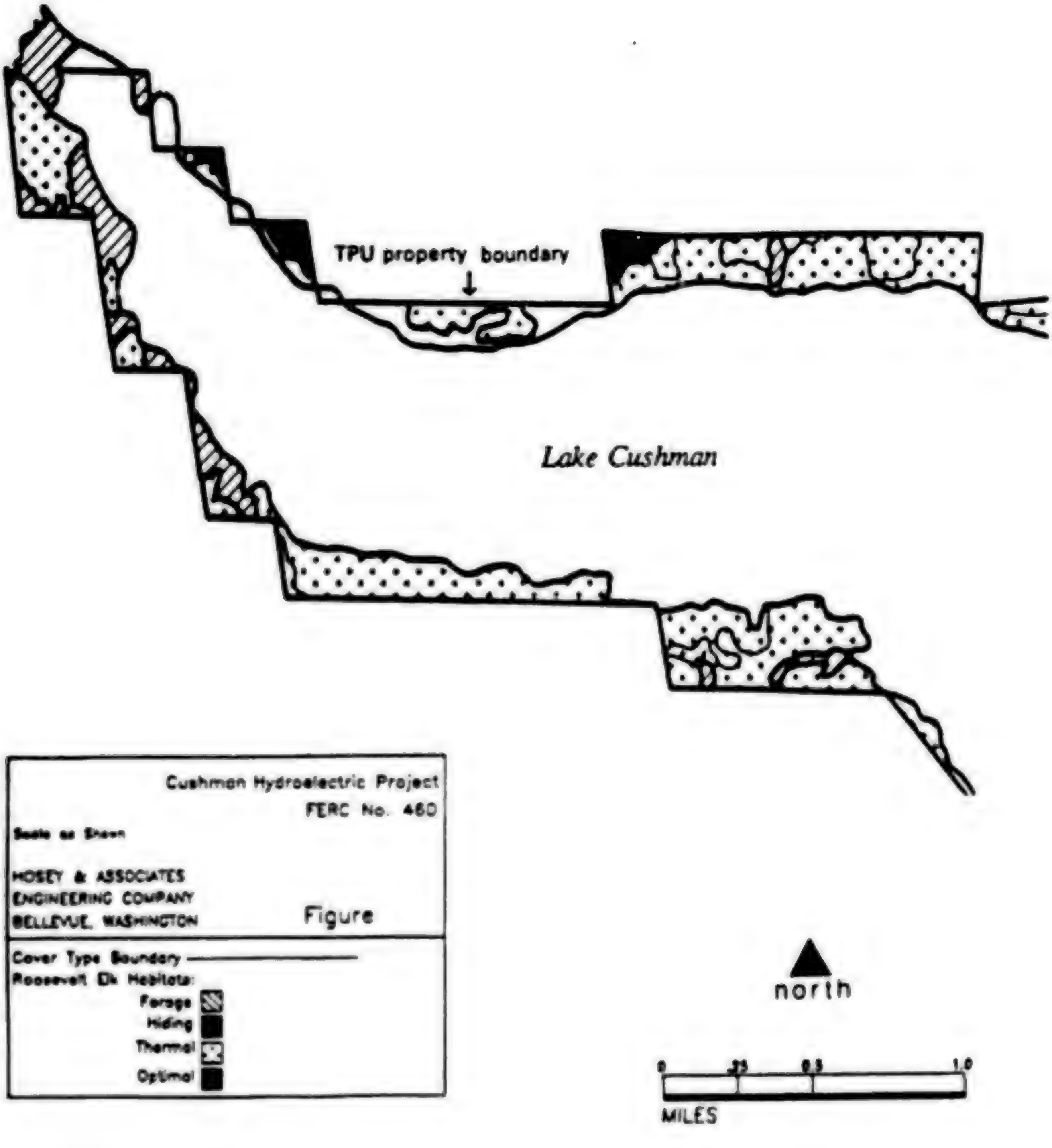


Figure 6. Elk habitat cover types for the study by Hosey & Associates, developed for the Cushman Hydroelectric Project (FERC No. 460).

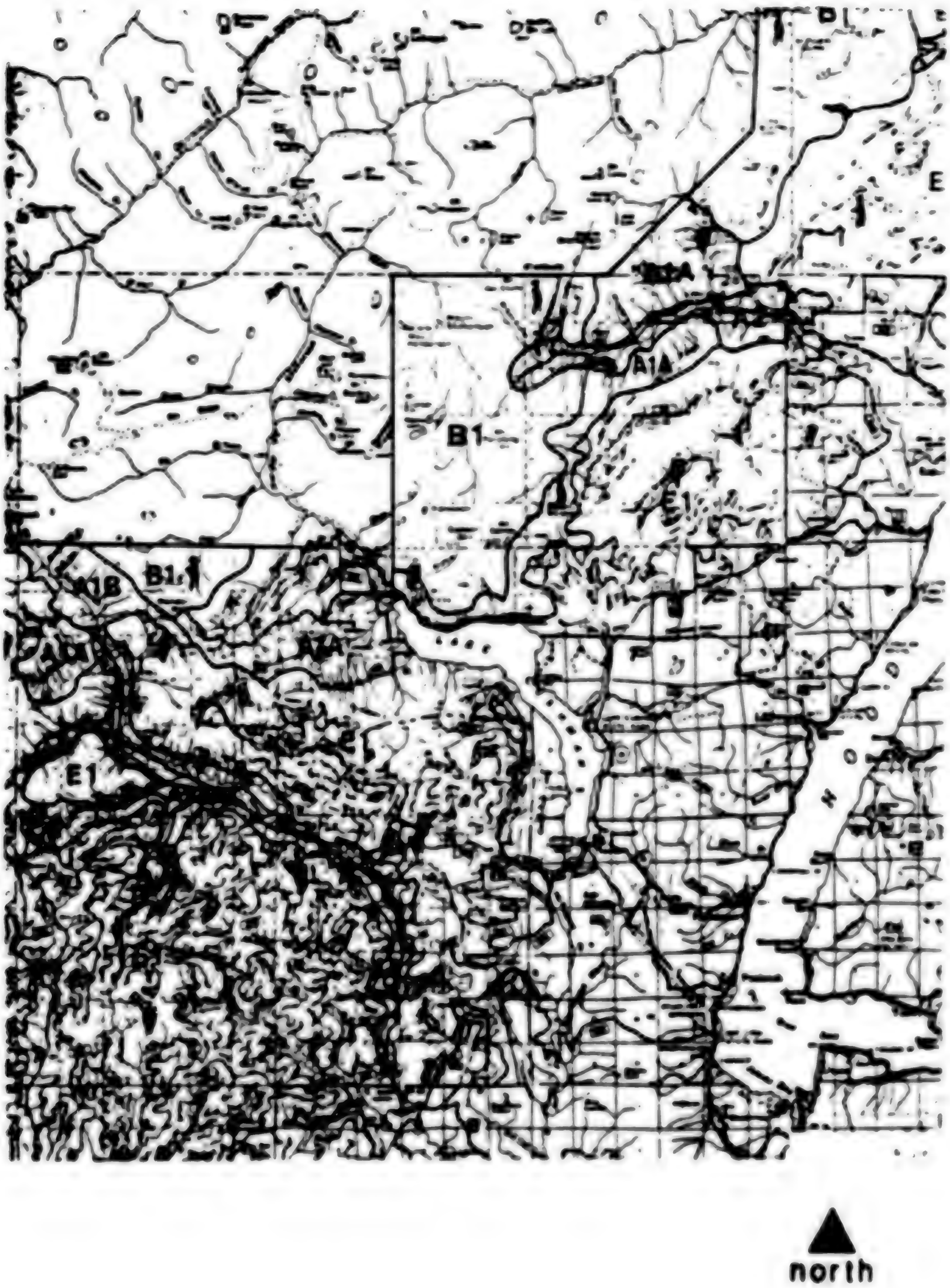


Figure 7. The Olympic National Forest - Forest Plan, Alternative C for USFS lands in the study area.

Appendix C

Letters/memos reporting results of Northern Spotted Owl Surveys conducted in vicinity of 30 acres of park lands near Cushman Reservoir, proposed for exchange.

United States Department of Agriculture
Forest Service
Olympic National Forest
Hood Canal Ranger District
P.O. Box 68
Hoodsport, WA 98548
(206) 877-5254

Reply to:

Date: 17 August 1992

Subject: Dry Creek Spotted Owl Site

To: John Aho

John, I have enclosed a summary of survey results from the Dry Creek Spotted Owl Site since 1990, when the area was first surveyed and a pair located. However, it may be that the site is not even within 2.2 miles of the proposed land exchange area. Since I was not exactly sure where the exact area is which is proposed for the land exchange I used the point where the forest service road #2451 crosses the Dry Creek Trail (trail #872) to measure distance to the owl pair sites. Looking at the site centers for all three years all are more than 2.2 miles from this intersection. There are two resident singles within 2.2 miles of the proposed land exchange area, the Lower Dry Creek site and the Slate Creek/Lincoln Creek site. However, you indicated previously that you were not interested in information on resident single sites.

I hope this information will be useful. If you have any questions I will be on leave until the 31st of August, but our biological technician Bob Roswell is familiar with spotted owl survey work on the district and should be able to help.

Elizabeth Milliman
Wildlife Biologist

Spotted Owl Survey Information
Dry Creek Pair Site

The Dry Creek Spotted Owl Habitat Area (SOHA) was first surveyed by district survey crews in 1990 when a reproductively successful pair was located. The general pair response area from 1990 was surveyed in 1991 by PNW owl research survey crews and the pair was relocated but nesting was not confirmed. Harza Northwest (consulting firm) surveyed the lower Dry Creek Trail area and located a territorial single. The area was surveyed again in 1992 by PNW owl research survey crews and the pair was relocated with two young.

Survey Results by year:

1990. Dry Creek SOHA was surveyed as part of 1990 Hood Canal District monitoring program using the 1990 Regional Spotted Owl Monitoring Protocal. Their were two pairs located in the SOHA in 1990 which were designated the Lebar pair and the Dry Creek pair. Survey work in the area began on 27 June and the first response was on 10 July, but was for the Lebar pair which does not affect the Cushman project. The following table displays all responses for 1990 for the Dry Creek pair detected by both district and PNW owl research crews.

Response Type	Age/Sex	Date	Survey Crew
visual	male	23 August	District
vocal	female	23 August	District
visual	male	24 August	District
vocal	juvenile	3 September	PNW
visual	male	6 September	PNW
vocal	juvenile	6 September	PNW
visual	male	7 September	PNW
vocal	juvenile	7 September	PNW
visual	male	15 September	PNW
banded	juvenile	15 September	PNW

1991. The Dry Creek pair site was surveyed by PNW owl research crews as part of their demographic study to monitor pair status and reproductive success. The area was first surveyed on 25 April, and the first response was on 11 July.

Response Type	Age/Sex	Date	Results
visual	male	11 July	Same as last year
visual	male/female	12 July	Male-heavy tail molt
visual	male	19 July	
visual	male	6 August	Has no tail feathers

1992. The Dry Creek pair site was surveyed by PNW owl research crews as part of their demographic study. The pair was first located on 22 April at the nest tree, with the female in the cavity.

Response Type	Age/Sex	Date	Results
visual	male/female	22 April	Female in cavity
visual	male/female	27 May	2 nestlings in cavity
visual	male/female	8 June	one fledgling
banded	female	8 June	
visual	male	28 July	with juvenile
banded	juvenile	28 July	

Appendix D

Study of Hydrology of Park lands near Cushman Reservoir

Applied Geotechnology Inc.

A Report Prepared For

Harza Northwest
2353 130th Avenue N.E., Suite 200
Bellevue, Washington 98005

Tacoma Public Utilities
Post Office Box 11007
Tacoma, Washington 98411

GROUNDWATER-SURFACE WATER INTERACTION STUDY LAKE CUSHMAN AND NORTH FORK SKOKOMISH RIVER HOODSPORT, WASHINGTON

by

Michael M. Zapico
Hydrogeologist

Mackey Smith, C.E.G.
Vice President

APPLIED GEOTECHNOLOGY INC.
300 120th Avenue N.E.
Building 4, Suite 215
Bellevue, Washington 98005
206/453-8383

January 7, 1992

INTRODUCTION

GENERAL

This report presents the results of Applied Geotechnology Inc.'s (AGI) Groundwater-Surface Water Interaction Study for Lake Cushman and the North Fork of the Skokomish River. The study was conducted from the end of August to mid-November 1991 for Tacoma Public Utilities (TPU) with input from Olympic National Park (ONP) personnel. The North Fork Skokomish River enters into the northern end of Lake Cushman within ONP. High water levels in the pool formed behind Cushman Dam inundate a delta at the mouth of the river. The dam has been owned and operated by City of Tacoma Public Utilities (TPU) since the late 1920s.

PURPOSE

The purpose of the study is to evaluate the effects of pool level fluctuations at Lake Cushman on the water table adjacent to the North Fork Skokomish River. The normal operating level of the reservoir behind Cushman Dam is 738 feet Cushman Datum (CD); however, the maximum pool elevation is 742 feet (CD). Lake levels at elevations ranging between 738 to 742 feet (CD) are likely to influence water table elevations and may affect vegetation and elk habitat. This study focuses on the interaction between surface water elevation in the river and the lake and groundwater in a point bar meander of the North Fork Skokomish River north of the southern boundary of ONP where the river empties into the lake.

Surface water and groundwater interaction at the project location is considered to be representative of the shores of the lake where unconsolidated sediments are found. The North Fork Skokomish River is recharged primarily by rainfall and snow and glacial meltwaters in the summer months and by rainfall during the fall, winter, and spring. Pool levels at Lake Cushman are controlled by TPU depending on dam operations and power demands.

SCOPE OF SERVICES

Our study focused on comparing water level elevations in the North Fork Skokomish River, groundwater adjacent to the river, and Lake Cushman pool levels for a 2-1/2-month period. The study was conducted through the following tasks:

1. **Data Compilation** - We obtained and evaluated relevant data on study area surficial and bedrock geology and topography. In addition, available historical and recent surface water data from Lake Cushman and the U.S. Geological Survey (USGS) gaging station at Staircase Rapids approximately 1.3 miles upstream were obtained and analyzed. River and pool locations were estimated using historical vertical aerial photographs.

2. **Field Reconnaissance** - We conducted a reconnaissance to assess the site setting, local geology, and hydrology, and to locate the water level monitoring system.

3. **Piezometer and Staff Gage Installation** - We installed a water level monitoring network consisting of five shallow piezometers to a maximum depth of 10 feet and a staff gage in the river. The monitoring network was divided into two transects. One was installed parallel to and the second perpendicular to the river.

4. **Water Level Monitoring** - ONP personnel monitored water levels on a weekly basis from August 28 to November 13, 1991 using equipment loaned by AGI.

5. **Data Analysis** - AGI used water level information to prepare historical and recent hydrographs of the North Fork Skokomish River and Lake Cushman.

6. **Report Preparation** - We prepared this report describing our investigative methods and presenting our findings and conclusions. The report contains figures and tables summarizing the data described above.

The effects of precipitation, infiltration, surface water runoff, and evaporation on groundwater and surface water were not addressed in this study.

The transect staff gage, piezometers and adjacent land surfaces were surveyed by TPU.

SITE DESCRIPTION

The project site is located at the northern end of Lake Cushman within ONP on a series of point bars in the mouth of the North Fork Skokomish River (see Figures 1 through 3). This area is considered favorable habitat for migrating elk.

The western shore of the bar is exposed at low river stages and consists of cobbles and boulders. This area is not vegetated. The bar rises sharply 4 to 5 feet to the east and becomes heavily vegetated with trees, shrubs, and grasses. The land surface is predominantly flat, although in places it is hummocky with swales. Ponded water is occasionally found in these low lying areas. A subtle levee parallels the river on the western side of the bar and forms a local topographic high.

FIELD INVESTIGATION

MONITORING NETWORK

A total of five piezometers (PZ-1 through PZ-5) and one staff gage were installed in two transects near the river. The primary transect extended approximately 800 feet inland and perpendicular to the shore of the river. The second transect was installed perpendicular to the first at its midpoint (Figure 3). The piezometers were spaced approximately 150 feet apart and were hand driven to depths ranging between 6 and 10 feet below ground surface (bgs).

The staff gage initially consisted of a stadia rod attached to a steel post driven and secured in the riverbed; however, within approximately 4 days the river had risen significantly following unseasonably heavy precipitation and the staff gage was destroyed. We replaced the gage with another that consisted of 2-inch-diameter PVC pipe and polyethylene tubing. The pipe was submerged and buried in the riverbed and formed an intake. The polyethylene tubing was attached to the pipe and ran horizontally from the intake to a steel post driven into the bank of the river. The tubing ran vertically up a post and functioned as a manometer. Water levels in the river were to be measured by sounding the tubing attached to the post. At the time of installation, this gage functioned well, but depended on the river to be at least to the middle of the PVC intake pipe. Within a week after the gage was installed, the river level dropped to a very low stage and the intake was no longer submerged. During this period, the bottom of the intake was used as a reference and water levels were measured relative to this point.

The piezometers consisted of 1-inch-diameter steel threaded and coupled pipe. The bottom of the piezometer was pointed and slotted over the lower 18 inches. The piezometers were installed by first digging to approximately 3 feet bgs using a shovel and hand auger. Boulders up to 1 foot in diameter were removed from the hole. From the base of this hole the piezometer was hand driven to refusal. All of the piezometers encountered water during installation except PZ-1, which encountered refusal at 8 feet bgs. During installation, the steel pipes frequently bent when cobbles and boulders were encountered. The top of each piezometer was capped with a rubber plug. A small hole was pierced in each plug to allow water level equilibration. At the end of the monitoring period the piezometers were jacked out of each hole and the holes collapsed.

Soil samples were obtained from the uppermost 3 feet of piezometer excavations for description and logging. The descriptions were incorporated into borehole logs, which are presented in the Appendix as Plates 2 through 6.

Weekly water levels were obtained by ONP personnel using an electric water level sounder and metal engineers tape. They were instructed how to use the sounder and take water levels. Water levels were measured to the nearest 0.01 foot and the data submitted to AGI. ONP personnel kept AGI informed of the status of the monitoring network, especially the staff gage.

GEOLOGICAL SETTING

REGIONAL

The North Fork Skokomish River dissects complexly folded and moderately faulted Tertiary metavolcanic, metasedimentary, sedimentary, and volcanic rocks. The metavolcanics and metasedimentary rocks are mostly metamorphosed basalts and the metasediments are greenstone and greenschist facies with some "semischists" and foliated sandstones (Tabor and Cady, 1978). These units tend to occur near the headwaters of the river. Downstream the river dissects a sedimentary and volcanic series, including conglomerates, sandstones, and argillites. The volcanics are basalts and may be interbedded with some sediments. The basalts are known as the Crescent Formation and the Blue Mountain Unit (Tabor and Cady, 1978).

Glacial sediments are found primarily in river valleys. The thickness of these deposits is unknown. They are divided into two primary groups, deposits from alpine glaciation associated with the Olympic mountains and those of the continental glaciation that originated in the Coast Range of British Columbia. The sediments are texturally and structurally similar but differ compositionally and include moraines and stratified gravel, sand, silt, and clay.

LOCAL GEOLOGY

The lower reach and mouth of the North Fork Skokomish River is bounded on the northeast and southwest by Tertiary basalts of the Crescent Formation (Figure 4). The river valley is filled with an unknown thickness of moraine and stratified gravel, sand, silt, and clay deposited by alpine glaciers from the Olympic Mountains. These deposits also include recent river flood stage deposits forming terraces along the river. Near the mouth of the river and in the vicinity of the monitoring network are glacial deposits from the continental ice sheet. These sediments are texturally and structurally similar to the glacial deposits found upstream, but are composed of rocks from outside the Olympic Mountains. The ihferred contact between these two units (Tabor and Cady, 1978) is approximately parallel to the primary leg of the monitoring transect.

Figure 5 shows the location of an east-west schematic cross section, which is presented as Figure 6. The cross section shows the local topographic high formed by the levee described above, as well as generalized site geology and water table fluctuation.

Surface sediments near the river are a coarse, gray, silty gravel. The gravel ranges in size from pebbles to boulders. Sediments in the near surface along the transect to the east-northeast are composed predominantly of silty sand, silty gravel, and sandy gravel. The near surface sediments constitute the unsaturated (vadose) zone. The texture and composition of sediments beneath this zone and extending to and below the local water table are unknown. However, they are likely similar to those found in the near surface.

RESULTS AND DISCUSSION

INTRODUCTION

Historical water level elevations for Lake Cushman and Staircase Rapids gaging station for the period 1925 to 1975 are presented in Tables 1 and 2 and plotted on Figures 7 and 8. These data were tabulated and plotted to provide a historical perspective for the water levels obtained during the 2-1/2-month monitoring period. January and August were selected to represent the relative wet and dry seasons, respectively. The maximum and minimum for each month were presented for comparison. In addition, data for these locations for the monitoring period September through mid-November 1991 are shown in Tables 3 and 4 and on Figure 9. These data are presented to compare with the monitoring network established for this project. The data are corrected to Cushman Dam datum (CD), which is 2.99 feet above USGS National Geodetic Vertical Datum (NGVD).

HISTORICAL WATER LEVEL FLUCTUATIONS

Maximum and minimum pool elevations at Lake Cushman for January and August 1930 through 1975 are shown in Table 1 and on Figure 7. Lake Cushman pool levels are controlled by TPU at Cushman Dam. The normal operating level is 738 feet CD; however, in the late 1980s, the reservoir level was decreased to allow for construction of a spillway. The water elevation coinciding with 1930 corresponds with completion of Cushman Dam and the subsequent years represent pool elevations controlled at the dam. The maximum elevation in the pool is 742 feet CD to allow for flooding; however, for the months and years plotted, this level was not reached.

January pool elevations demonstrate large changes in elevation and range from a high of approximately 739 feet CD in 1935 to a low of approximately 700 feet CD in 1970. August pool elevations fluctuate less than those for January and range from approximately 722 feet CD to nearly 740 feet CD.

The river at the Staircase Rapids gaging station demonstrates less overall change. A maximum is observed in January at approximately 773 feet CD to a low of approximately 768 feet CD. In August the maximum of approximately 768.75 feet CD occurred in 1950. This is nearly equal to the January or wet season minimum. The lowest August river stage of nearly 766.5 feet CD occurred in 1930. Stage levels for January reflect rainfall while those for August are due to rainfall and glacial and snow melt in the highlands of the drainage basin.

MONITORING PERIOD

During the monitoring period of August 28 through mid-November, water level elevations at both the lake and Staircase Rapids fluctuated over a wide range due to unseasonable rainfall (see Tables 3 and 4 and Figure 9). Unseasonably heavy rain occurred in August while little rain fell during the remainder of the monitoring period. In November, precipitation increased to seasonal levels.

At the lake, the pool level decreased from a maximum of about 735 feet CD to a minimum of nearly 710 feet CD. Upstream at Staircase Rapids the maximum stage elevation was approximately 768.75 feet CD at the beginning of the monitoring period, decreased to approximately 766.75 feet CD in mid-October, and then rose erratically to a maximum of nearly 770.5 feet CD by mid-November. The maximum change in stages in the river is approximately 4 feet compared to 25 feet in Lake Cushman.

During the early part of the monitoring period both the river and the lake levels declined and groundwater levels correspondingly decreased except for a minor rise on September 4 (Figure 9). This reflects the unseasonably dry period that occurred during this time. Toward the end of the monitoring period, precipitation increased and the river level rose. The peaks and valleys shown for Staircase Rapids on Figure 9 may indirectly reflect periods of soil wetting and groundwater recharge following the period of low rainfall. During this period lake levels continued to decline, as shown for Lake Cushman on Figure 9.

The monitoring network water level elevation for the transect staff gages and Piezometers 1 through 5 (PZ-1 through PZ-5) are presented in Table 5 and plotted on Figures 10 through 13. The changes in groundwater levels are predominantly associated with changes in surface water elevations in the river; however, to a lesser extent, infiltration through the vadose zone is also shown on these figures. Groundwater levels monitored for this period reflect this increase in precipitation in November and recharge both from surface water and infiltration.

Surface water stages at the transect staff gage are presented on Figure 10. The transect staff gage was reported dry on October 30, 1991. A composite plot is also presented on Figure 10 of the transect staff gage compared to Staircase Rapids and shows agreement between the two gages. In general, stage levels at the transect staff gage dropped from a maximum elevation near 745 feet CD to approximately 742 feet CD. Near the end of the monitoring period, water levels were again increasing.

During the monitoring period, PZ-1 was dry due to its relatively shallow depth of installation. Water levels in PZ-2 through PZ-5 decreased over time until the middle of October and then increased until the end of the monitoring period. Water levels in PZ-4 dropped below the piezometer intake for almost the entire month of October and then rose again, mimicking the trend seen in PZ-2, PZ-3, and PZ-5. The tops of PZ-3 and PZ-5 were reported by ONP personnel as occasionally submerged; however, groundwater levels were not measured on these days. Whether the submergence reflects surface water ponded in response to heavy rainfall and low infiltration rates or a rise in the water table is unclear.

Depths to water levels are shown in Table 6 and on Figures 11 and 12. The data are indicative of the unsaturated zone thickness and may be used to infer root zone thickness. The thickness of the root and unsaturated zones is important relative to the vegetation found in this area. Figures 11 and 12 show the general trends for the unsaturated zone in the study area and also indirectly reflect local surface topography.

Depth to water below ground surface ranged from a minimum of 0.11 foot in PZ-5 to more than 10 feet in PZ-4; however, groundwater is generally approximately 1.5 to 3 feet bgs. During the monitoring period the deepest depth to groundwater occurred in PZ-4. For this monitoring period the vadose (unsaturated) zone thickness varied from less than 0.5 foot to more than 10 feet.

A composite plot of the transect staff gage, piezometers PZ-2 through PZ-5, and Lake Cushman water elevations is presented on Figure 13. This plot illustrates the parallel response of river stage and groundwater elevations over time and the decrease in the lake level for this period. The parallel response of the river is well illustrated by PZ-5, which mimics and is closest to the surface water elevations due to its proximity to the river. Further away from the river at PZ-4, the same trend (excluding the period when the piezometer was dry in October) is seen. The groundwater elevations reflect a dampening effect that results in a lag between the instantaneous changes in the river level and the resultant change in groundwater. The lack of influence at the period between the lake and the groundwater system is apparently due to decreasing pool elevation.

Potentiometric surface maps for the highest water levels measured in August and the lowest water levels measured in October are presented on Figures 14 and 15. The maps show groundwater flowing from the river inland and to the south, indicating groundwater recharge by the river during the monitoring period. The hydraulic gradient in October during the lowest water table level is slightly steeper than in August and suggests recharge may be the greater at this time. During this period the lake level dropped to approximately 715 feet. Figure 15 shows only the river channel because the lake fell to a level that cannot be shown on the figure. Water levels for August were the highest in both the groundwater and surface water systems. The hydraulic gradient is slightly lower and appears to reflect the influence of Lake Cushman to the southern extent of the study area.

Depths to water maps are presented on Figures 16 and 17. In general, the shallowest water table (approximately 2 feet bgs) for these months is to the north to the north-northeast. Depth to the water table increases to the southwest. This is a reflection of surface topography and shows that local topography increases in the same direction. This is also seen on the cross section (Figure 6).

- The response of the project site water table to lake levels between 738 to 742 feet CD elevation is unknown; however, we expect the primary influence of these lake levels on the project site water table would be to elevate the overall water table to the lake elevation. The mounded water table associated with recharge from the North Fork Skokomish River will still reflect river stage where the stage is above the elevation of the lake. The water table near the river may be slightly higher and slope less steep away from the river to the surrounding water table at lake level.

- Additional monitoring would be required to verify water table response to lake levels between Elevation 738 to 742 feet CD.

REFERENCES

Grimstad, Peder and R.J. Carson. 1981. Geology and Ground-Water Resources of Eastern Jefferson County, Washington, Washington Department of Ecology.

Tabor, R.W. and W.M. Cady. 1978. Geologic Map of the Olympic Peninsula, Washington, U.S. Geological Survey.

Tabor, R.W. and W.M. Cady. 1978. The Structure of the Olympic Mountains, Washington - Analysis of a Subduction Zone, U.S. Geological Survey, Professional Paper 1033.

DISTRIBUTION

1 Copy

Harza Northwest
2353 130th Avenue N.E., Suite 200
Bellevue, Washington 98005

Attention: Ms. Pam Klatt

1 Copy

Tacoma Public Utilities
Post Office Box 11007
Tacoma, Washington 98411

Attention: Mr. Garth Jackson

1 Copy

Olympic National Park
600 E. Park Avenue
Port Angeles, Washington 98362

Attention: Mr. John Aho

Quality Assurance/Technical Review by:

Jan F. Deick

Jan F. Deick
Project Hydrogeologist

MMZ/MS/jlh

TABLES

Table 1
Historic Lake Cushman Reservoir
Monthly High and Low Pool Elevations
Five-Year Intervals From 1930 Through 1975

Year	January		August	
	Min (ft)	Max (ft)	Min (ft)	Max (ft)
1930	663.90	669.85	723.00	723.59
1935	726.64	738.72	732.14	734.71
1940	733.20	736.42	724.67	730.78
1945	715.64	723.06	735.81	736.87
1950	724.48	732.37	736.17	737.99
1955	725.48	732.33	735.66	737.98
1960	718.98	731.20	735.06	738.01
1965	716.40	725.00	737.61	737.92
1970	691.00	702.10	727.80	735.88
1975	706.50	716.30	736.78	734.89

Source: Tacoma Public Utilities.
Datum: Cushman Dam which is 2.99 feet above
USGS 1929 NGVD.

Table 2
Historic North Fork Skokomish River
Staircase Rapids
Monthly High and Low River Stage Elevations
Five-Year Intervals From 1925 Through 1970

	January				August			
	Gage		Gage		Gage		Gage	
Year	Min Height (ft)	Min Elevation (ft)	Max Height (ft)	Max Elevation (ft)	Min Height (ft)	Min Elevation (ft)	Max Height (ft)	Max Elevation (ft)
1925	2.26	767.51	5.18	770.44	1.58	766.83	2.04	767.29
1930	1.90	767.15	2.45	767.70	1.39	766.64	1.66	766.91
1935	2.16	767.41	7.76	773.01	1.84	767.09	2.2	767.45
1940	2.56	767.81	6.82	772.07	1.57	766.82	1.81	767.06
1945	2.36	767.61	5.86	771.11	1.77	767.02	2.18	767.43
1950	2.21	767.46	4.91	770.16	2.10	767.35	3.56	768.81
1955	2.32	767.57	3.53	768.78	2.05	767.30	2.91	768.16
1960	2.01	767.26	6.03	771.28	1.76	767.01	2.09	767.34
1965	1.94	767.19	4.44	769.69	1.53	766.78	1.85	767.10
1970	2.23	767.48	4.86	770.11	1.50	766.75	1.78	767.03

Source: USGS Water Resources Division from unpublished records.
Datum: Cushman Dam which is 2.99 feet above USGS 1929 NGVD.

Table 3
Lake Cushman Reservoir
Daily High and Low Pool Elevations
September 2 to November 15, 1991

Date	Min	Max
09/02/91	737.0	737.2
09/03/91	736.9	737.1
09/04/91	736.7	736.9
09/05/91	736.3	736.7
09/06/91	736.0	736.4
09/07/91	735.7	736.0
09/08/91	735.5	735.7
09/09/91	735.0	735.5
09/10/91	734.4	735.0
09/11/91	734.3	734.8
09/12/91	734.1	734.3
09/13/91	733.7	734.1
09/14/91	733.4	733.7
09/15/91	732.9	733.4
09/16/91	732.1	733.0
09/17/91	732.4	732.7
09/18/91	732.0	732.4
09/19/91	731.6	732.0
09/20/91	731.2	731.6
09/21/91	730.6	731.2
09/22/91	730.1	730.6
09/23/91	729.6	730.1
09/24/91	729.1	729.6
09/25/91	728.5	729.1
09/27/91	727.7	728.1
09/28/91	727.1	727.7
09/29/91	726.7	727.1
09/30/91	726.3	726.7
10/01/91	725.7	726.3
10/02/91	725.2	725.7
10/03/91	724.8	725.2
10/04/91	724.3	724.8
10/05/91	723.9	724.3
10/06/91	723.4	723.9
10/07/91	722.9	723.4
10/08/91	722.2	722.9
10/09/91	721.7	722.2
10/10/91	721.1	721.7
10/11/91	720.5	721.1
10/12/91	720.4	720.6
10/13/91	720.1	720.4
10/14/91	720.0	720.3
10/15/91	719.7	720.0
10/16/91	719.6	719.8
10/17/91	719.2	719.6
10/18/91	719.1	719.2
10/19/91	718.9	719.1
10/20/91	718.7	718.9
10/21/91	718.5	718.8
10/22/91	718.2	718.5
10/23/91	717.9	718.2
10/24/91	717.6	718.0
10/25/91	717.2	717.6
10/26/91	716.6	717.2
10/27/91	716.0	716.6
10/28/91	715.3	716.0
10/29/91	714.8	715.4
10/30/91	714.3	714.8
10/31/91	713.9	714.3
11/01/91	713.4	713.9
11/02/91	713.2	713.4
11/03/91	712.8	713.2
11/04/91	712.7	712.8
11/05/91	712.5	712.7
11/06/91	712.0	712.5
11/07/91	711.6	712.0
11/08/91	711.5	711.6
11/09/91	711.1	711.5
11/10/91	710.9	711.1
11/11/91	711.4	710.9
11/12/91	711.4	711.6
11/13/91	711.6	711.7
11/14/91	711.3	711.6
11/15/91	711.0	711.4

Source: Tacoma Public Utilities.
Datum: Cushman Dam which is 2.99 feet above USGS 1929 NGVD.

Table 4
North Fork Skokomish River
Staircase Rapids
Daily Gage Elevations
September Through November 1991

	September		October		November	
	Gage		Gage		Gage	
Date	Height (ft)	Elevation (ft)	Height (ft)	Elevation (ft)	Height (ft)	Elevation (ft)
1	3.49	768.74	1.77	767.02	1.65	766.90
2	3.09	768.34	1.76	767.01	1.61	766.86
3	2.86	768.11	1.75	767.00	1.57	766.82
4	2.71	767.96	1.73	766.98	2.03	767.28
5	2.59	767.84	1.71	766.96	2.45	767.70
6	2.50	767.75	1.70	766.95	1.99	767.24
7	2.44	767.69	1.69	766.94	1.87	767.12
8	2.37	767.62	1.68	766.93	1.99	767.24
9	2.32	767.57	1.66	766.91	1.92	767.17
10	2.27	767.52	1.65	766.90	1.94	767.19
11	2.23	767.48	1.65	766.90	3.17	768.42
12	2.19	767.44	1.63	766.88	2.94	768.19
13	2.16	767.41	1.62	766.87	2.70	767.95
14	2.12	767.37	1.62	766.87	2.38	767.63
15	2.09	767.34	1.62	766.87	2.20	767.45
16	2.07	767.32	1.71	766.96	2.57	767.82
17	2.05	767.30	1.67	766.92	3.95	769.20
18	2.02	767.27	1.62	766.87	3.17	768.42
19	2.00	767.25	1.60	766.85	5.27	770.52
20	1.97	767.22	1.59	766.84	4.72	769.97
21	1.95	767.20	1.60	766.85	3.61	768.86
22	1.92	767.17	1.69	766.94	3.18	768.43
23	1.90	767.15	1.70	766.95	2.99	768.24
24	1.90	767.15	1.79	767.04	3.36	768.61
25	1.88	767.13	1.71	766.96	3.74	768.99
26	1.86	767.11	1.64	766.89	3.22	768.47
27	1.85	767.10	1.60	766.85	2.99	768.24
28	1.83	767.08	1.58	766.83	2.86	768.11
29	1.81	767.06	1.57	766.82	2.74	767.99
30	1.79	767.04	1.55	766.80	2.63	767.88
31			1.57	766.82		

Source: USGS Water Resources Division from unpublished records.
Datum: Cushman Dam which is 2.99 feet above USGS 1929 NGVD.

Table 5
Water Level Data for Piezometers and Transect Staff Gage
August 28 through November 13, 1991

		08/28/91		09/04/91		09/18/91		09/25/91		10/02/91		10/09/91	
	Reference Elevation (ft) [a]	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)
PZ-1	749.84	>8	<738.06	>8	<738.06	>8	<738.06	>8	<738.06	>8	<738.06	>8	<738.06
PZ-2	746.61	5.81	740.80	5.74	740.87	6.81	739.80	6.87	739.74	7.00	739.61	7.17	739.44
PZ-3	742.59	2.10	740.49	2.06	740.53	3.20	739.39	3.16	739.43	3.31	739.28	3.45	739.14
PZ-4	743.61	3.58	740.03	3.67	739.94	4.70	738.91	4.85	738.76	5.06	738.55	>10	<733.61
PZ-5	744.76	2.91	741.85	0.61	744.15	3.65	741.11	3.79	740.97	3.97	740.79	4.13	740.63
Staff Gage	Variable [b]	3.10	745.00	2.40	745.26	0.20	742.36	0.25	742.30	0.05	742.10	0.16	742.21

		10/16/91		10/24/91		10/30/91		11/06/91		11/13/91	
	Reference Elevation (ft) [a]	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)	Depth to Water (ft)	Water Elevation (ft)
PZ-1	749.84	>8	<738.06	>8	<738.06	>8	<738.06	>8	<738.06	>8	<738.06
PZ-2	746.61	7.17	739.44	6.52	740.09	7.37	739.24	6.91	739.70	5.13	741.48
PZ-3	742.59	3.31	739.28	2.49	740.10	3.65	738.94	3.91	738.68	1.64	740.95
PZ-4	743.61	>10	<733.61	>10	<733.61	>10	<733.61	4.87	738.74	3.15	740.46
PZ-5	744.76	4.15	740.61	3.28	741.48	4.32	740.44	3.44	741.32	1.79	742.97
Staff Gage	Variable [b]	0.00	742.05	0.00	742.05	0.00	742.05	0.40	743.28	N/A	N/A

Source: Tacoma Public Utilities.

a) Cushman Dam datum which is 2.99 feet above USGS 1929 NGVD.
b) Staff gage reference elevation changed during the course of the monitoring period (see text).
N/A - Not available.

Table 6
Depth to Water Below Ground Surface
August 28 through November 13, 1991

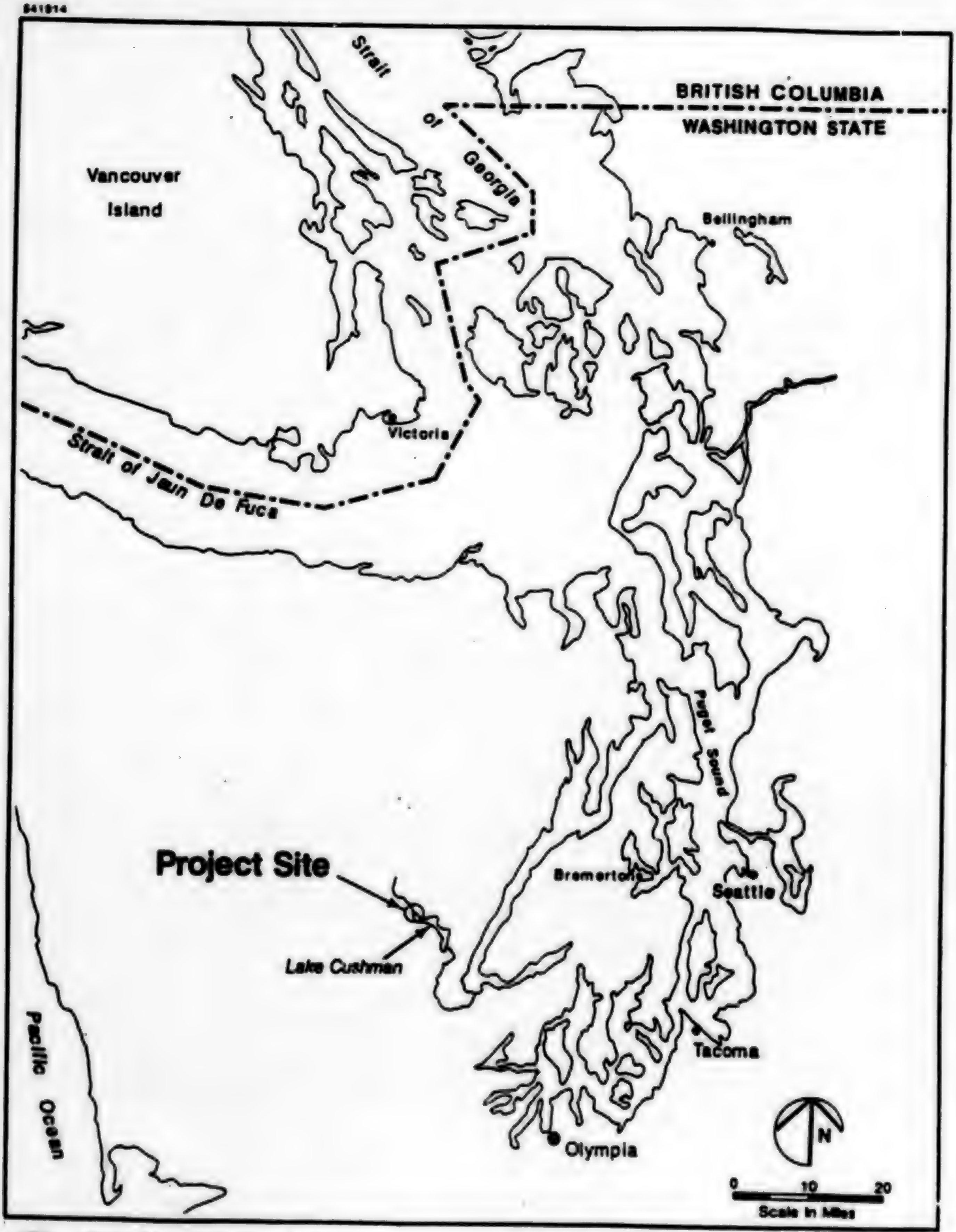
	Ground Elevation (ft)[a]	Depth to Water Below Ground Surface (ft)										
		08/28	09/04	09/18	09/25	10/02	10/09	10/16	10/24	10/30	11/06	11/13
PZ-1	749.05	>8	>8	>8	>8	>8	>8	>8	>8	>8	>8	>8
PZ-2	743.42	2.62	2.55	3.62	3.68	3.81	3.98	3.98	3.33	4.18	3.72	1.94
PZ-3	741.58	1.09	1.05	2.19	2.15	2.30	2.44	2.30	1.48	2.64	2.90	0.63
PZ-4	743.16	3.13	3.22	4.25	4.40	4.61	>10	>10	>10	>10	4.42	2.70
PZ-5	744.26	2.41	0.11	3.15	3.29	3.47	3.63	3.65	2.78	3.82	2.94	1.29

Source: Tacoma Public Utilities.

a) Cushman Dam datum which is 2.99 feet above USGS 1929 NGVD.

FIGURES

841914



Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

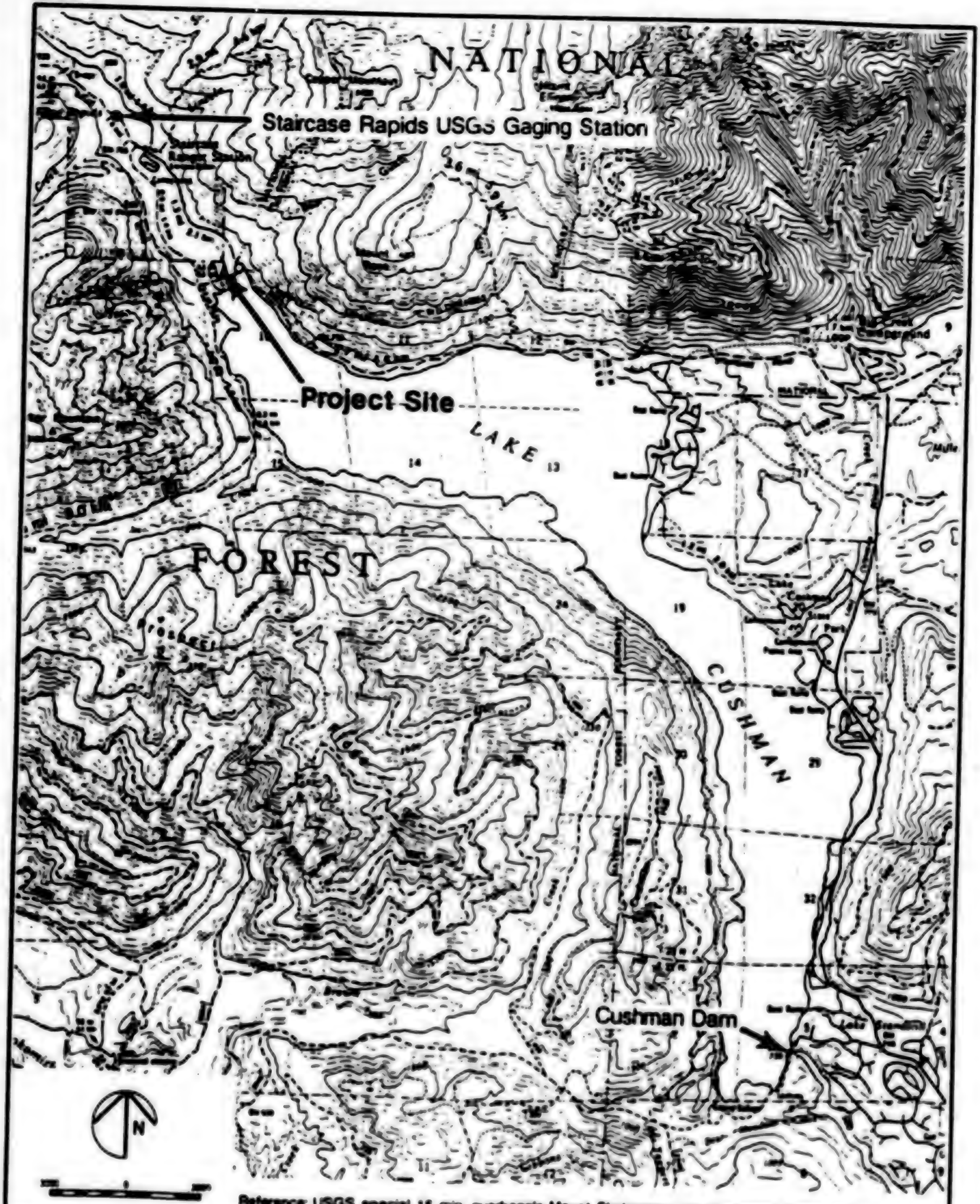
Vicinity Map

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
1

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	DFF	MMZ	1/2/92		

541814



Reference: USGS special 15 min. quadrangle Mount Skokomish-Lake Cushman, Washington

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

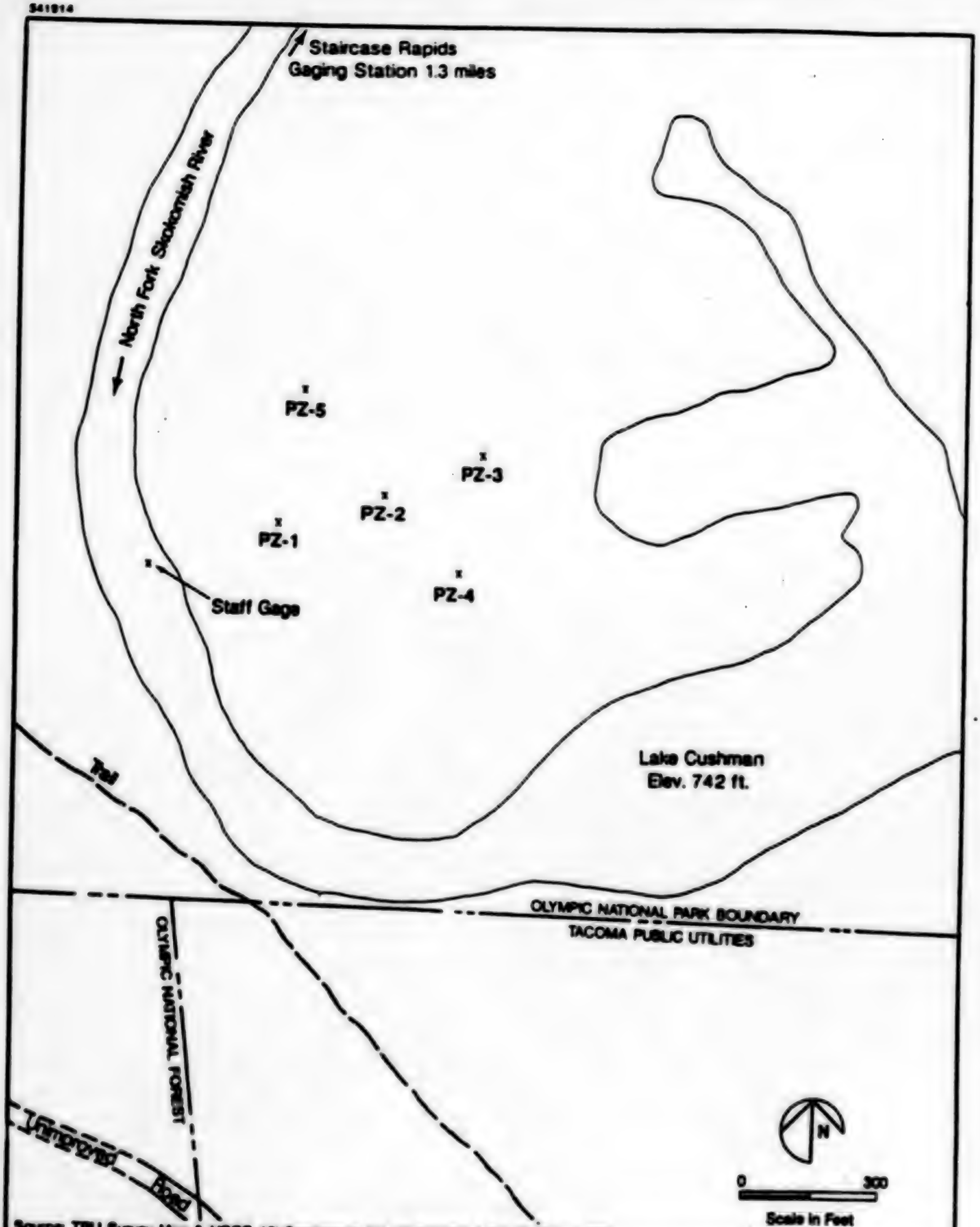
Site Location Map

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
2

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,589.001	DFF	MHE	1/2/92		

341914



Source: TPU Survey Map & USGS 15' Quadrangle Mt. Skokomish, Lake Cushman, WA.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

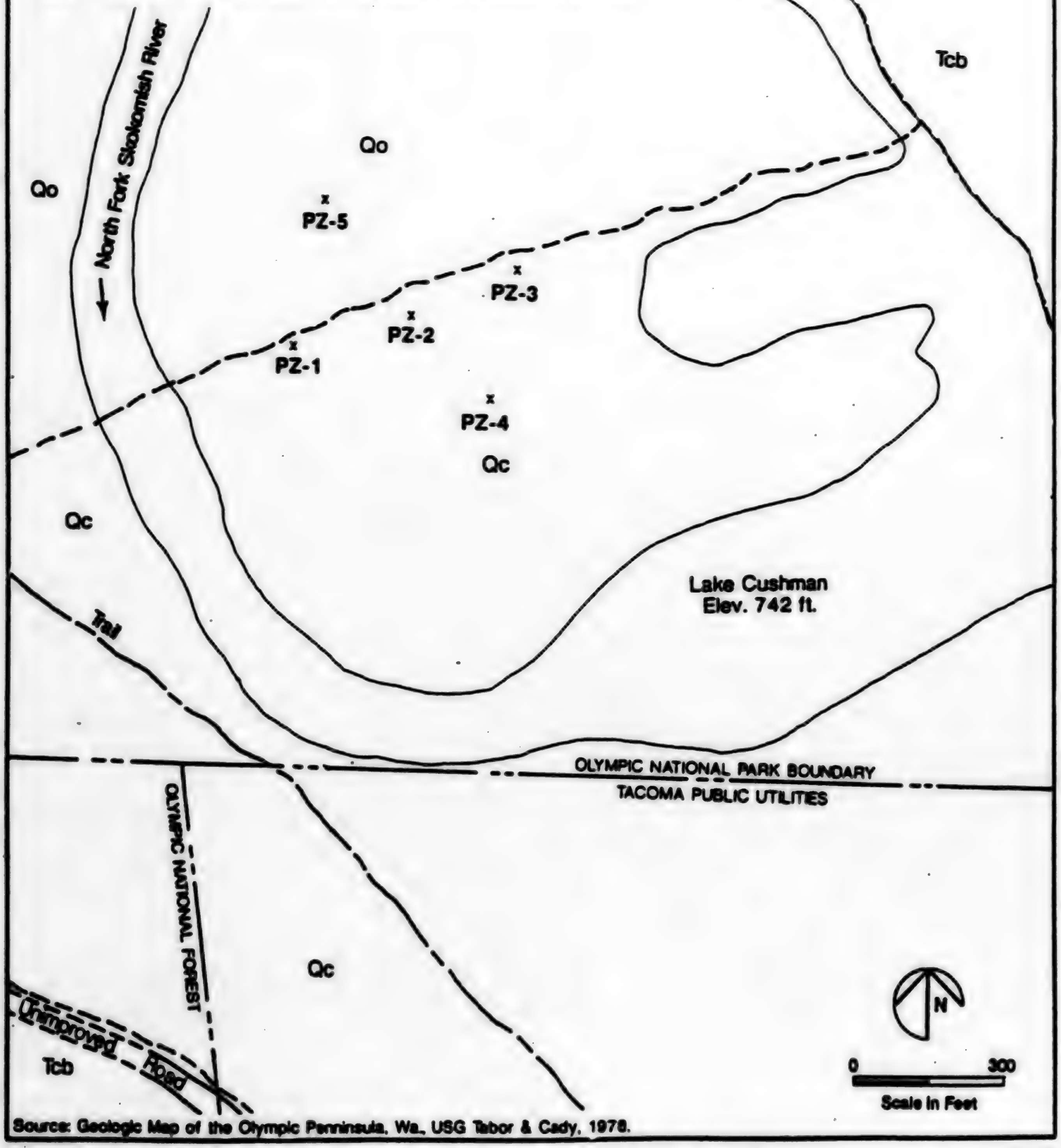
Site Plan

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
3

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	DFF	MMZ	1/2/92		

	Olympic Peninsula
Qo	Deposits of the olympic alpine glaciers - Moraine and stratified deposits including sand, gravel, silt, and clay; characterized by clasts derived from the Olympic Mountains. Includes high river terraces along major rivers that may not be directly associated with glaciation
Tcb	Basalt, massive flows, pillows, and breccia; minor diabase and gabbro



Source: Geologic Map of the Olympic Penninsula, Wa., USG Tabor & Cady, 1978.

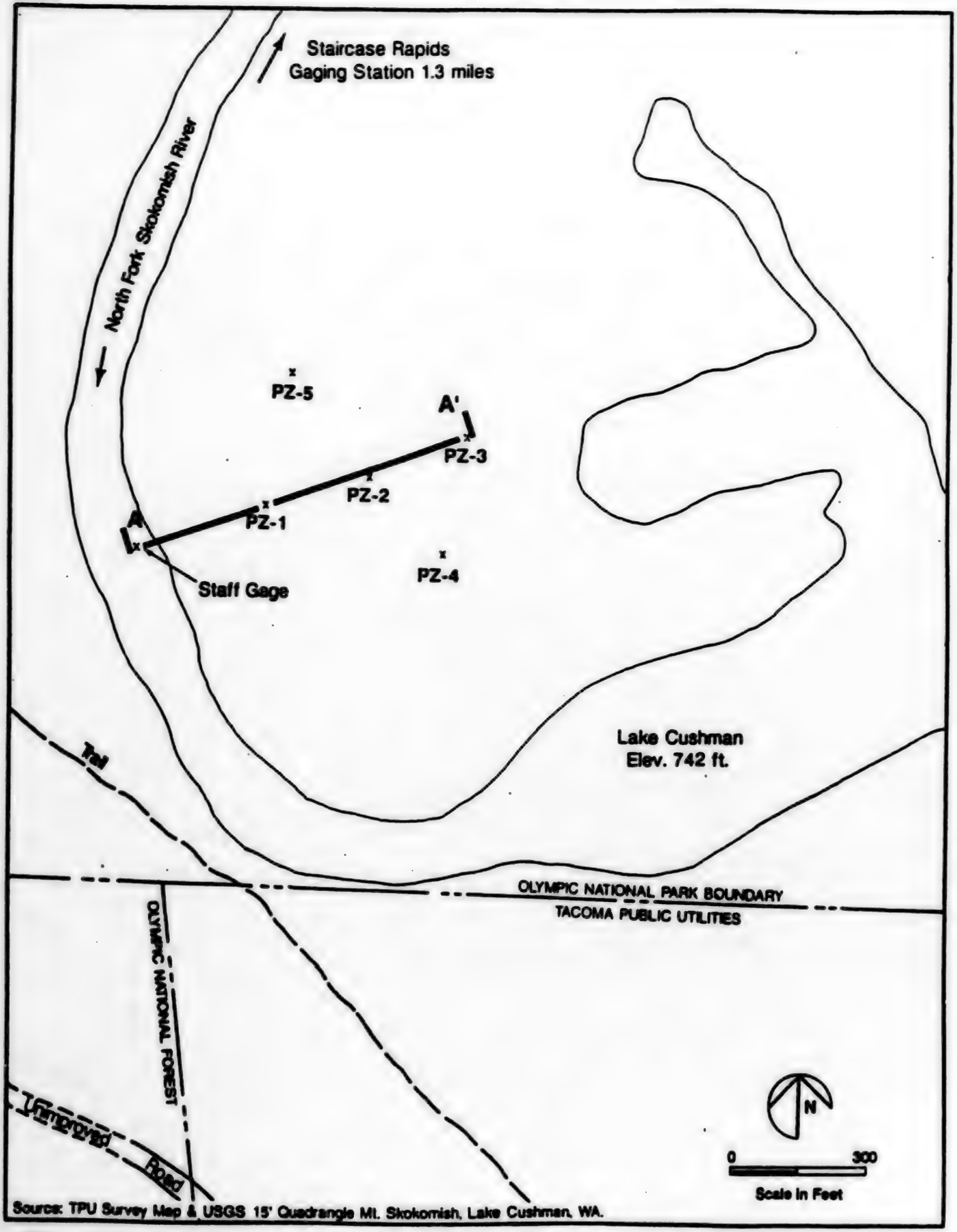
Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Geologic Map

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
4

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	DFF	MMZ	1/2/92		



Source: TPU Survey Map & USGS 15' Quadrangle Mt. Skokomish, Lake Cushman, WA.

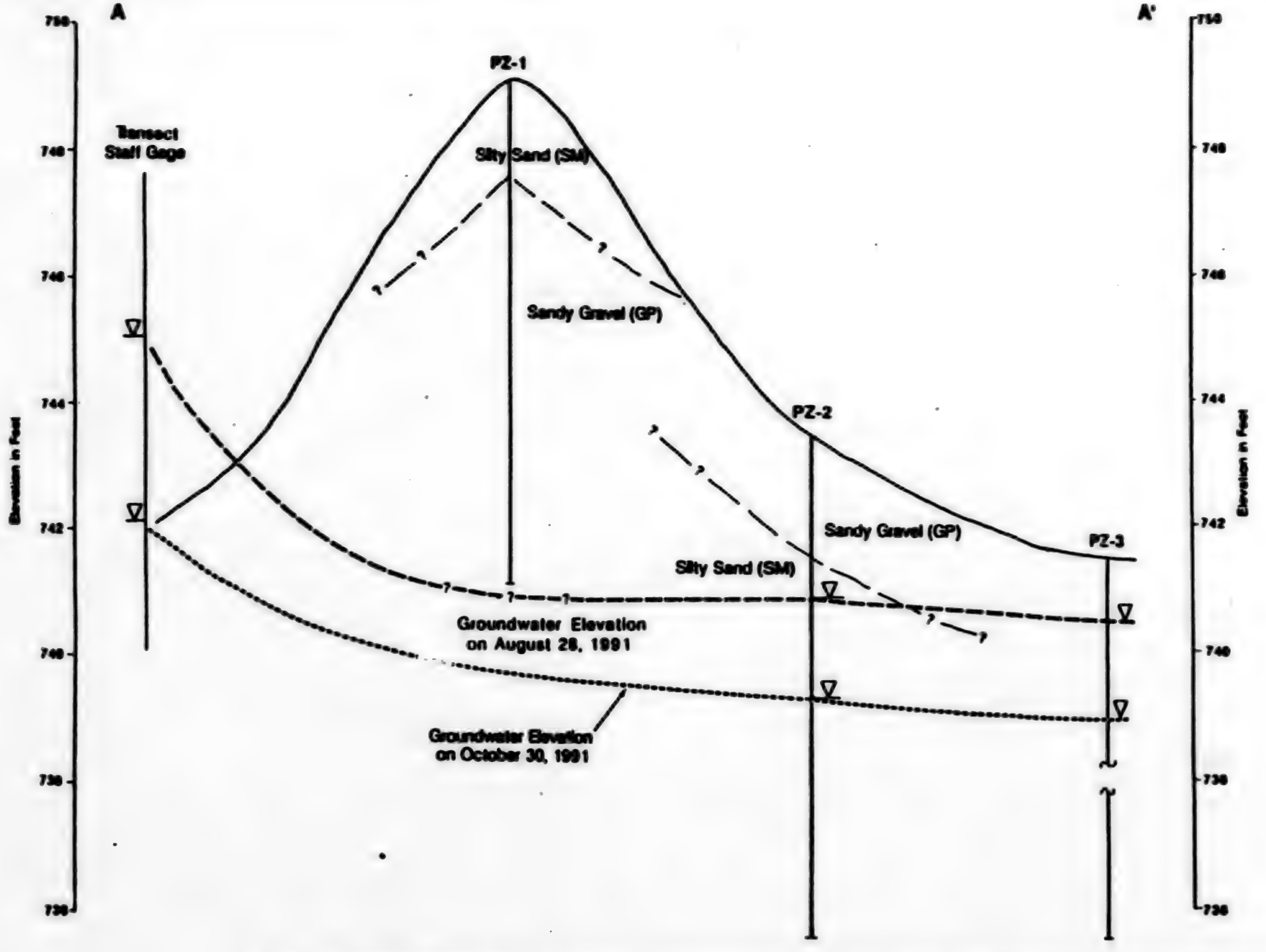
Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Cross Section Location Map

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
5

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	DFF	MME	1/2/92		



Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

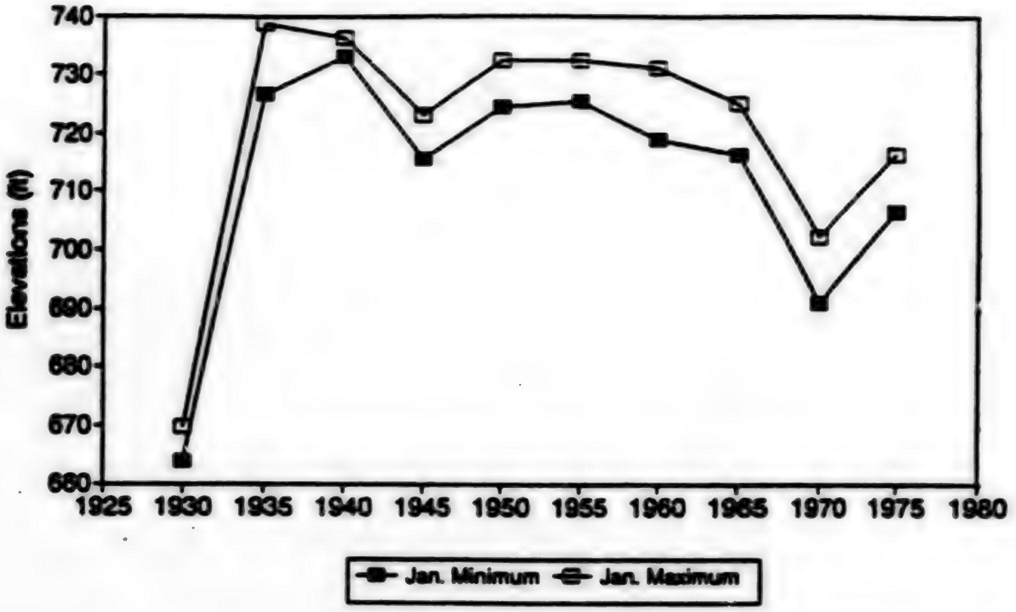
Geologic Cross Section A-A'

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

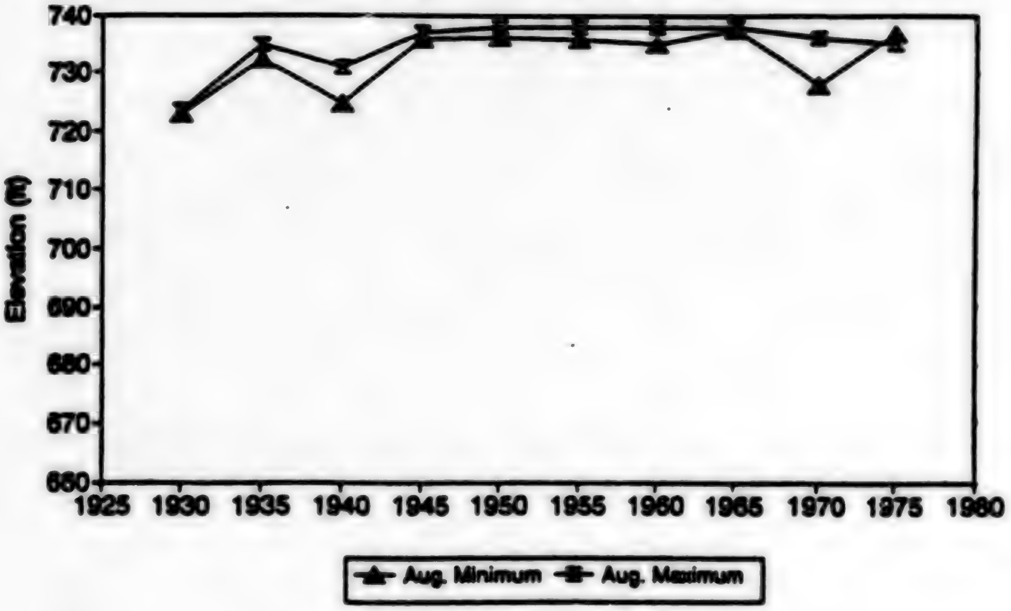
FIGURE
6

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	MCT	MHZ	1/2/92		

841914



January Minimums and Maximums



August Minimums and Maximums

Source: Tacoma Public Utilities. Datum: Cushman Dam which is 2.99 feet above USGS 1929 NGVD

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Historic Lake Cushman Elevations

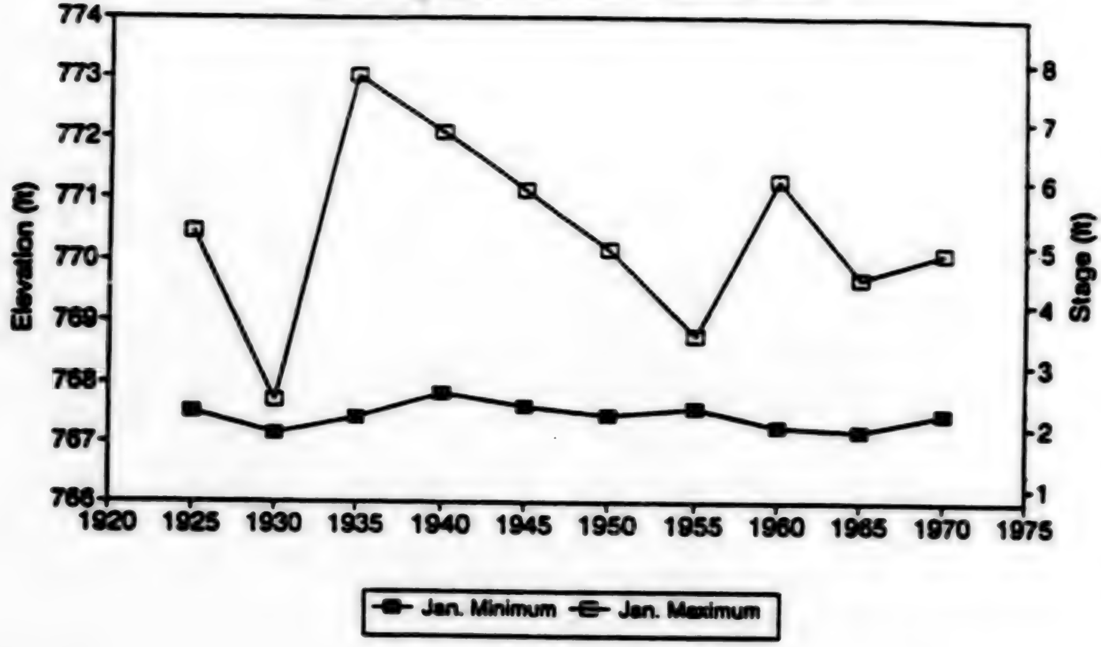
Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
7

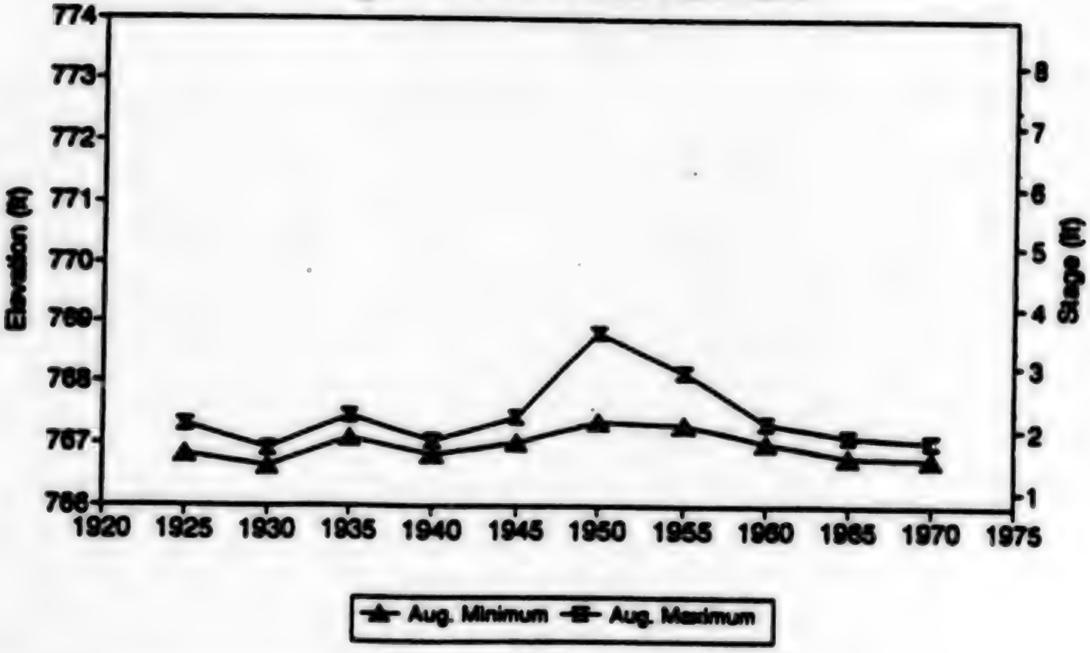
JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	MCT	MME	1/2/92		

841914

January Minimums and Maximums



August Minimums and Maximums



Source: USGS, Staircase Rapids, unpublished record. Gage datum = 765.25, corrected to Cushman Dam datum.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

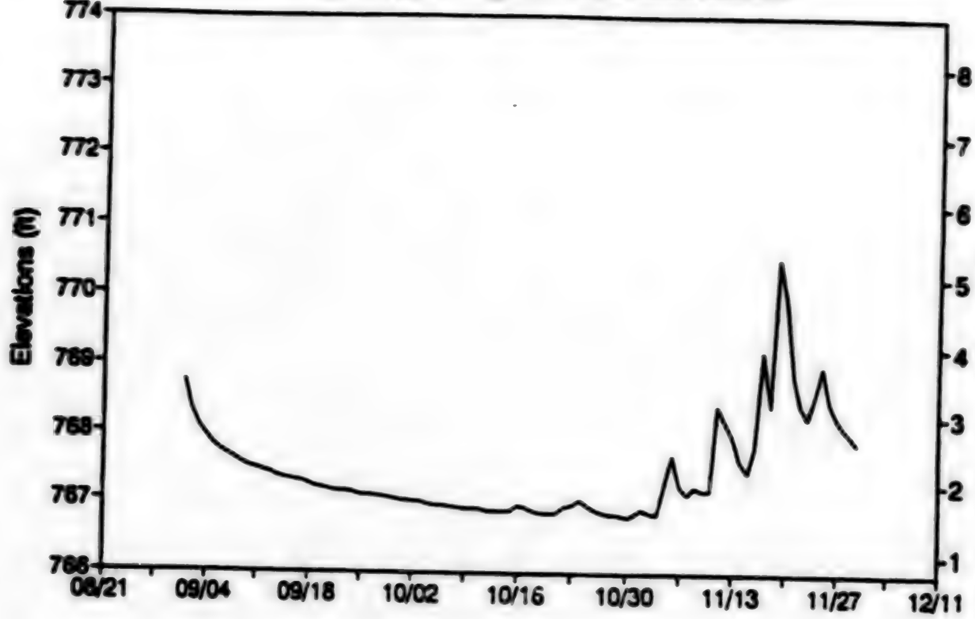
Historic Staircase Rapids Elevations
North Fork Skokomish River
Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
8

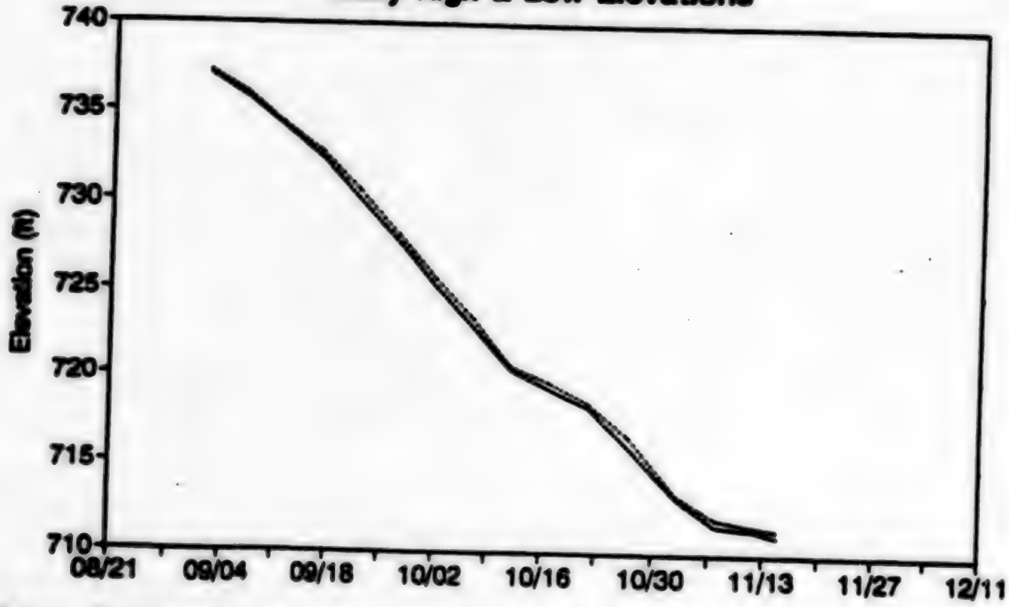
JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,990.001	MCT	MMZ	1/2/92		

941814

Staircase Rapids
Daily Gage Heights and Elevations



Lake Cushman Pool
Daily High & Low Elevations



Source: USGS, Staircase Rapids, unpublished record, and TPU for Lake Cushman. Gage datum = 765.25 ft., corrected to Lake Cushman datum.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Surface Water Elevations Aug.-Nov. 1991

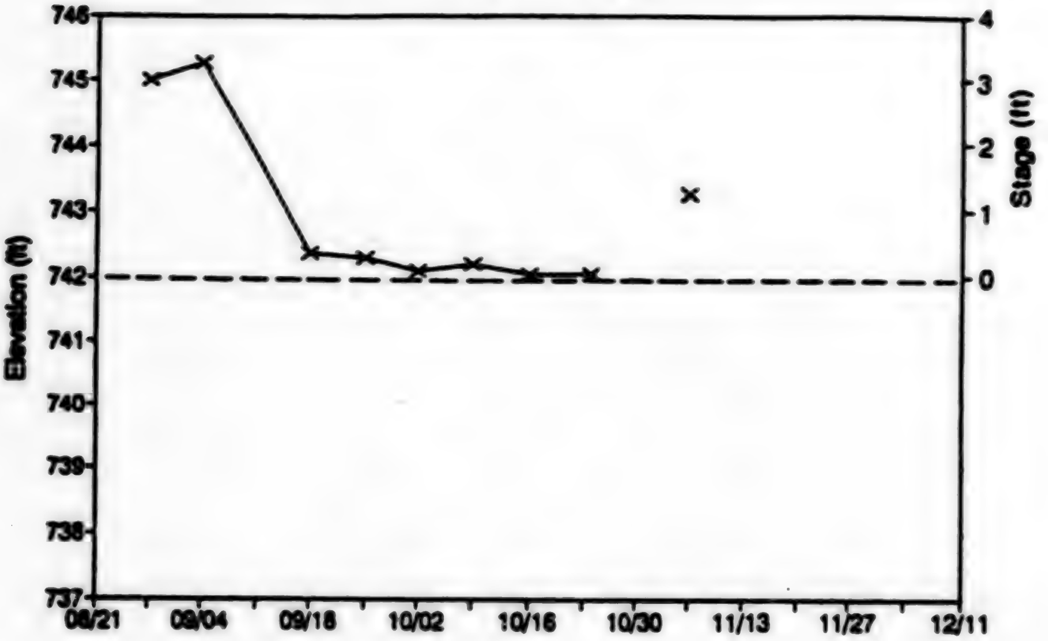
Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
9

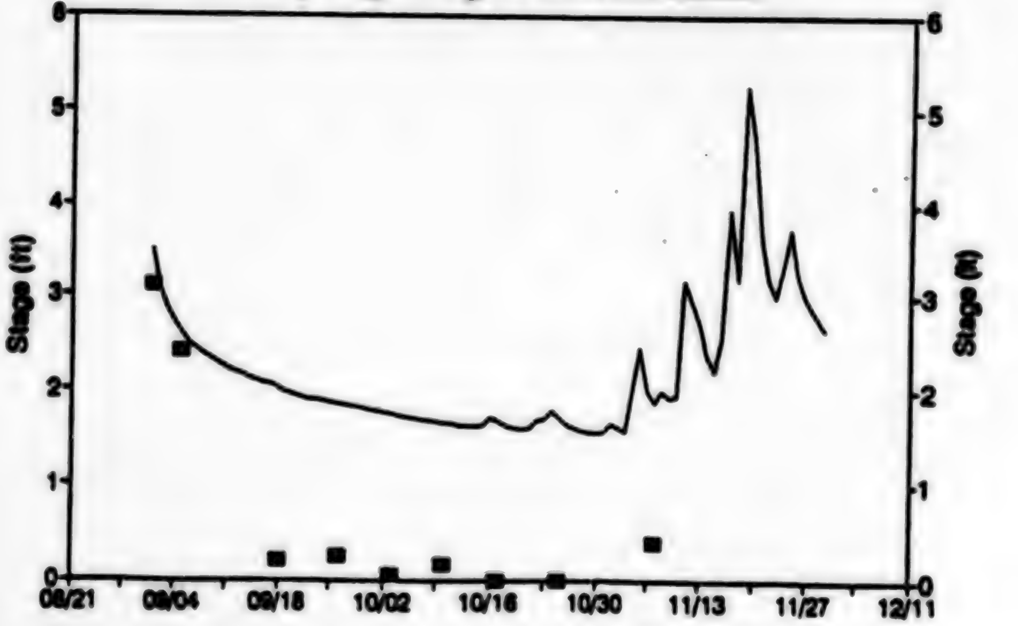
JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,899.001	MCT	MMZ	1/2/92		

941814

Transect Staff Gage



Staircase Rapids & Transect Staff Gage
Daily Gage Heights and Elevations



Source: USGS, Staircase Rapids, unpublished record.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

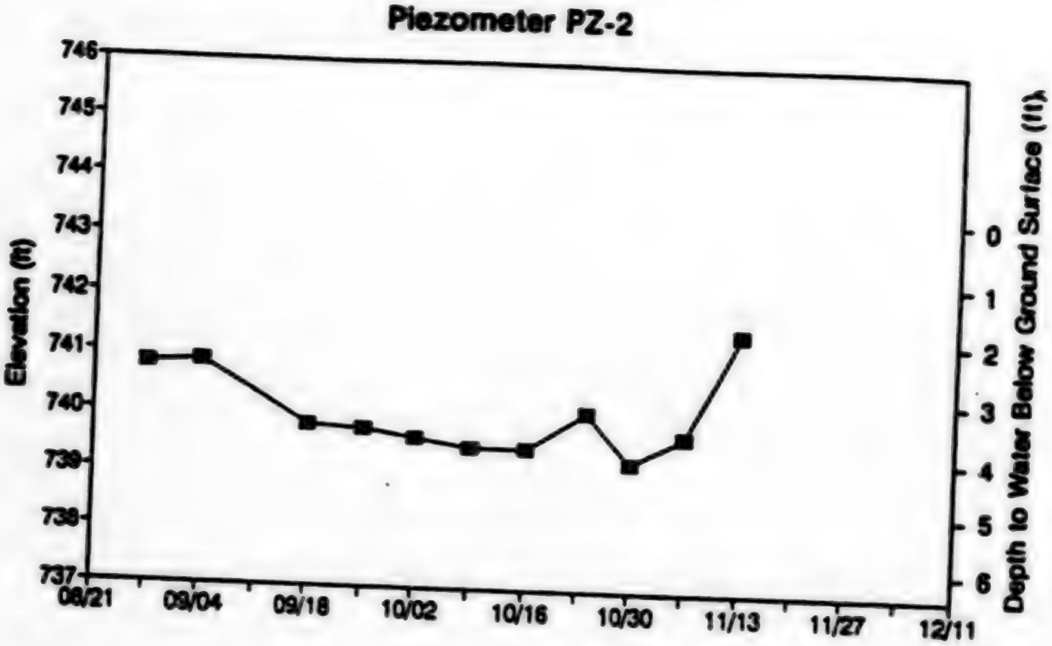
Transect Staff Gage

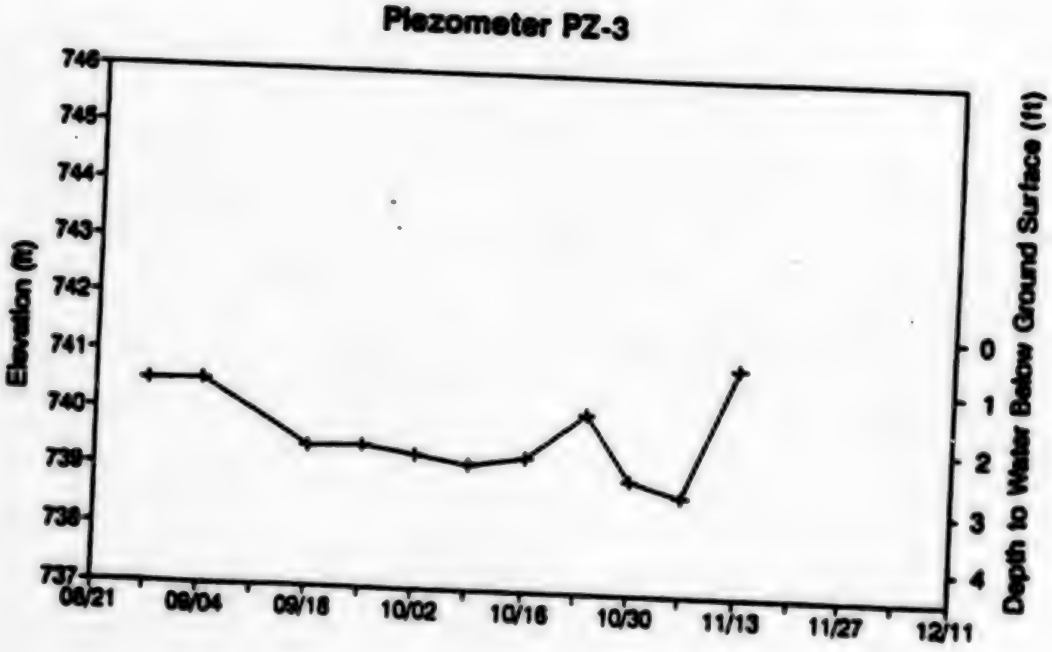
Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
10

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
16,399.001	MCT	MMZ	1/2/92		

541814





Note: Elevations relative to Cushman Dam Datum.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

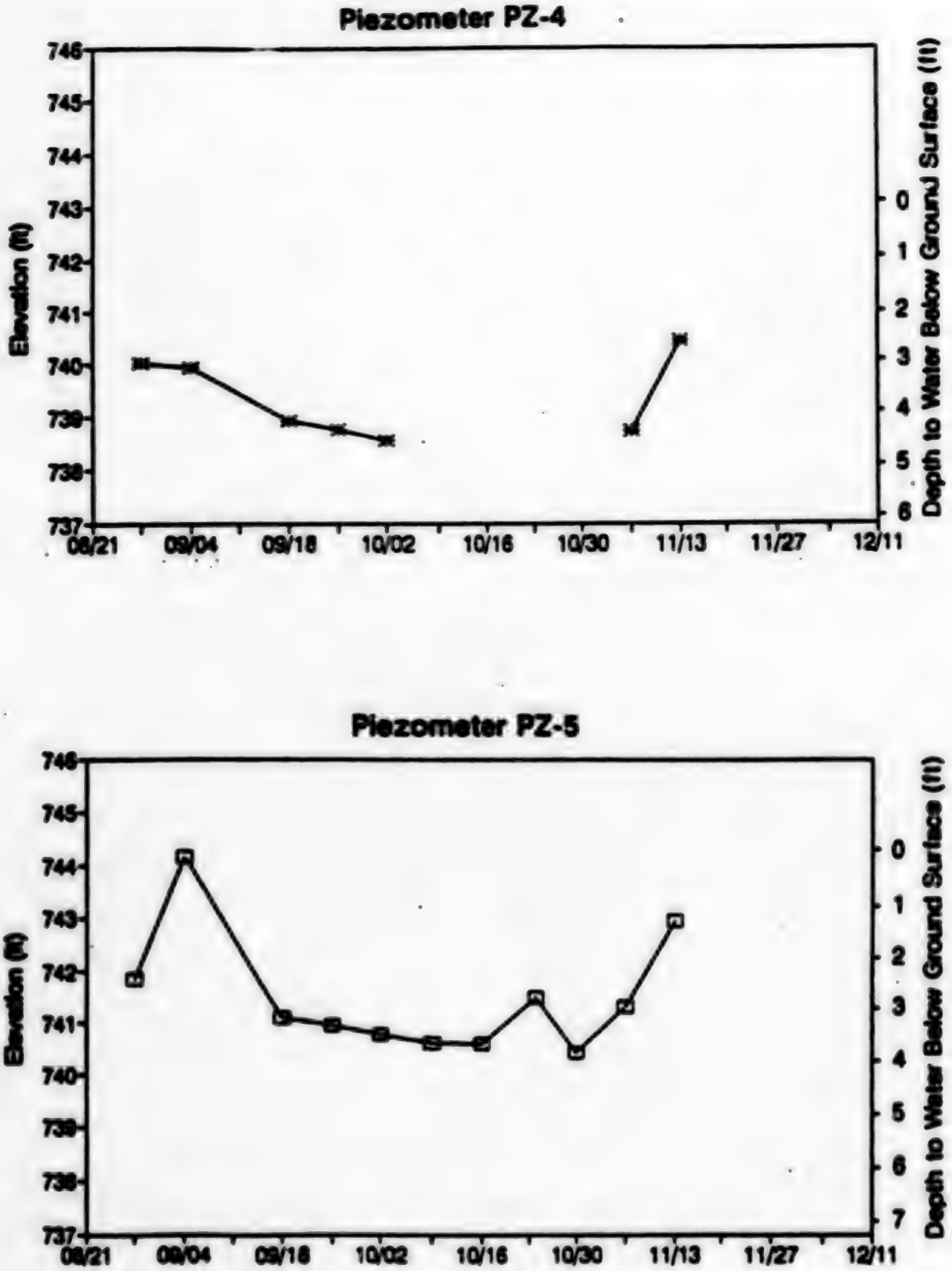
Groundwater Elevation PZ-2 & PZ-3

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE 11

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,889.001	MCT	MMZ	1/2/92		

841814



Note: Elevations relative to Cushman Dam Datum.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

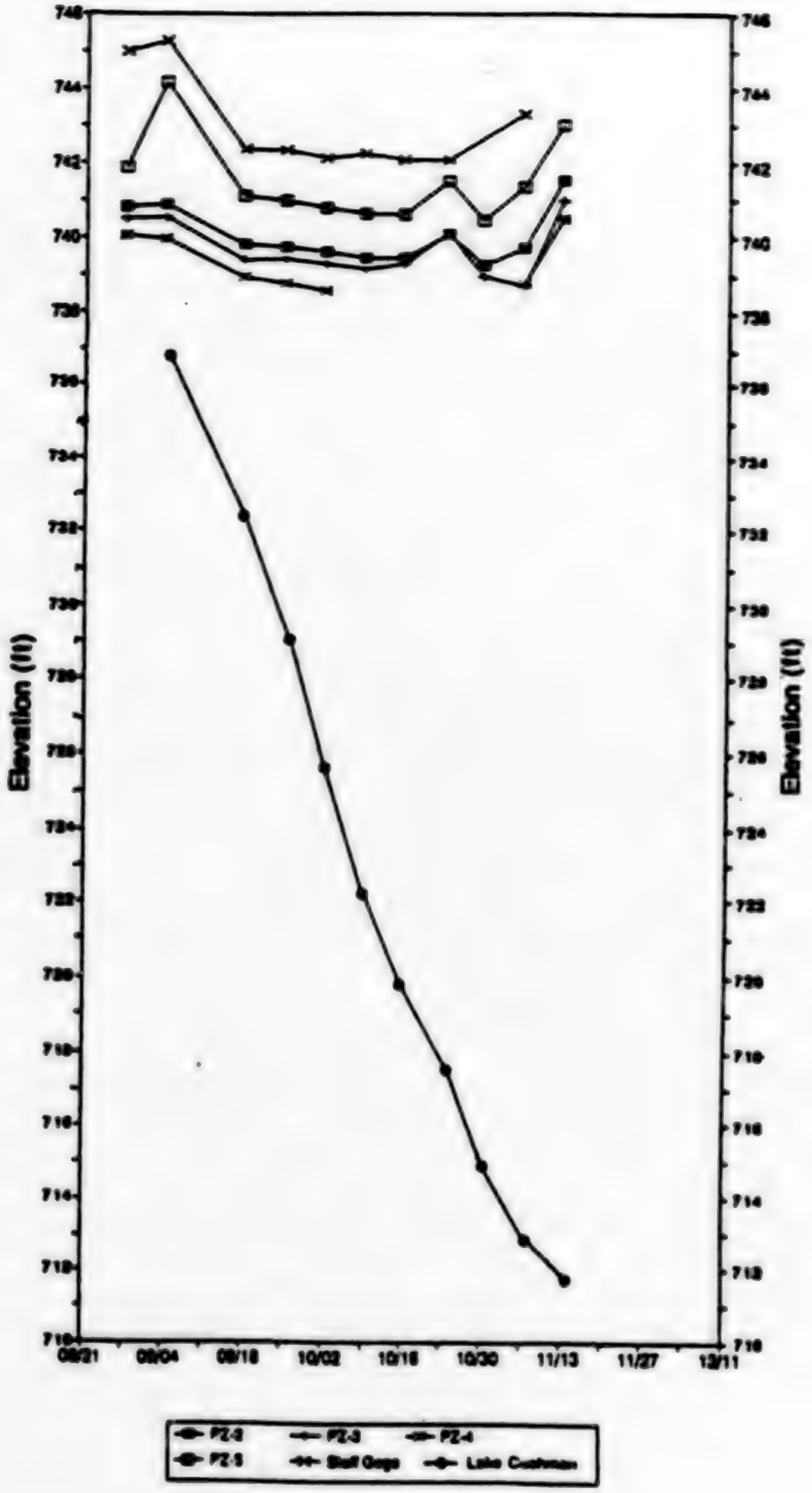
Groundwater Elevations PZ-4 & PZ-5

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
12

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	MCT	MME	1/2/92		

841914



Note: Elevations relative to Cushman Dam Datum.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

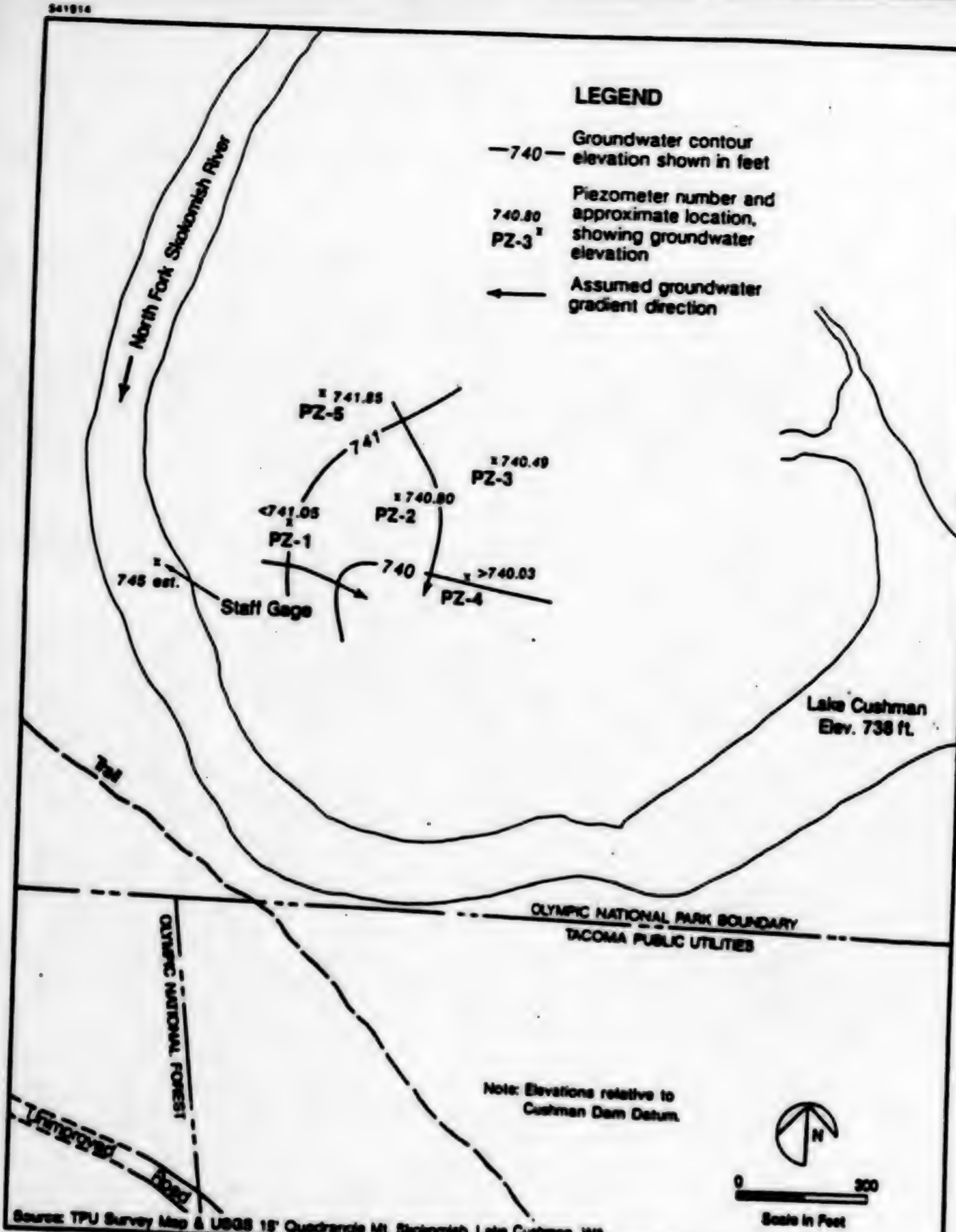
Lake Cushman and Monitoring Network

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
13

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,589.001	MCT		1/2/92		

541914


LEGEND
—740— Groundwater contour elevation shown in feet
740.80 PZ-3 x Piezometer number and approximate location, showing groundwater elevation
Assumed groundwater gradient direction
North Fork Skokomish River
741.85 PZ-5
741
740.49 PZ-3
740.80 PZ-2
<741.05 PZ-1
740
>740.03 PZ-4
745 est.
Staff Gage
Lake Cushman Elev. 738 ft.
Trail
OLYMPIC NATIONAL PARK BOUNDARY
TACOMA PUBLIC UTILITIES
OLYMPIC NATIONAL FOREST
Unimproved Road
N
0
300
Scale in Feet

Note: Elevations relative to Cushman Dam Datum.

Source: TPU Survey Map & USGS 15' Quadrangle Mt. Skokomish, Lake Cushman, WA.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

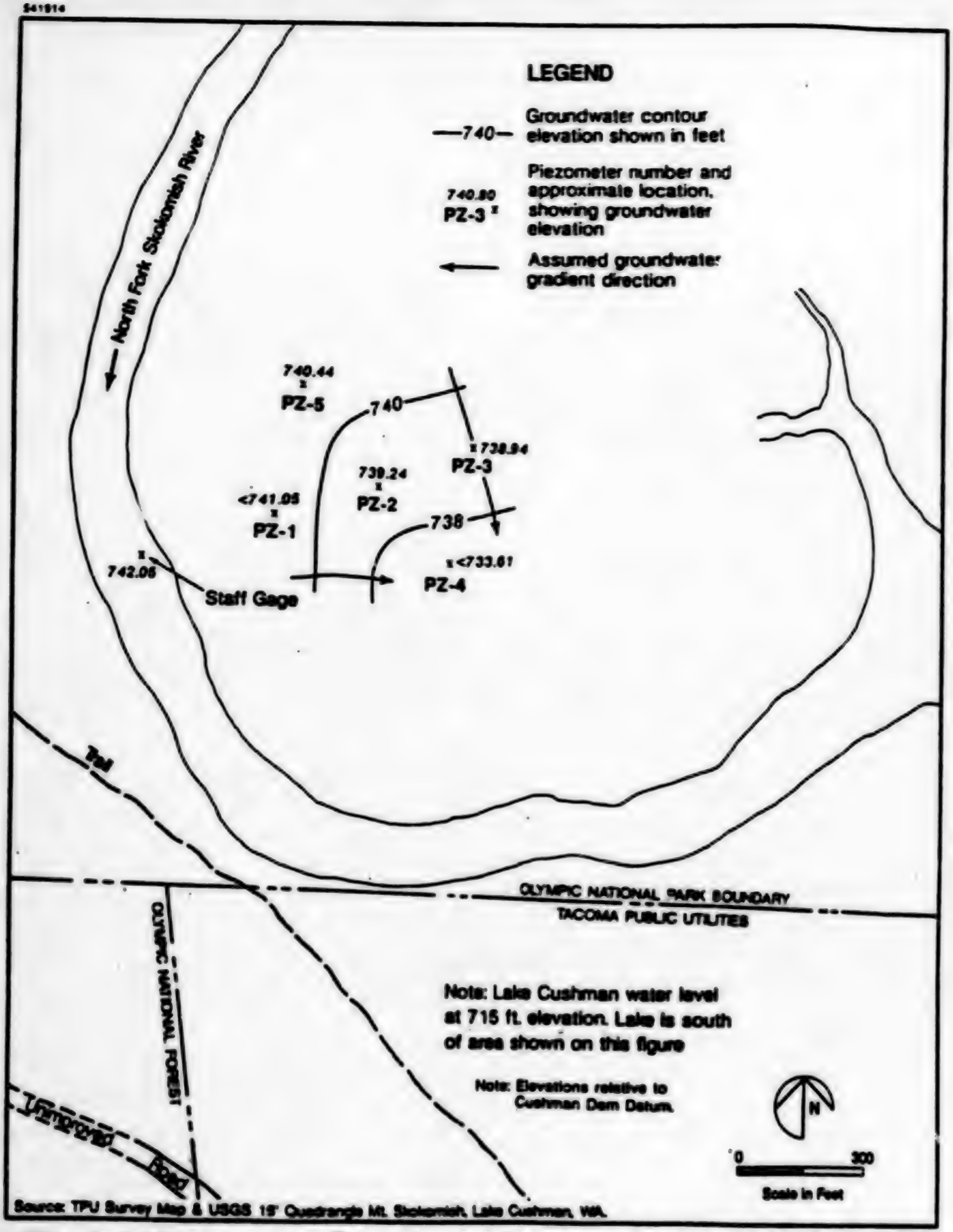
Groundwater Elevations August 28, 1991

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
14

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	DFF	MMZ	1/2/92		

541914


LEGEND
—740— Groundwater contour elevation shown in feet
740.80 PZ-3 x Piezometer number and approximate location, showing groundwater elevation
Assumed groundwater gradient direction
North Fork Skokomish River
740.44
PZ-5
740
x 738.94
PZ-3
739.24
PZ-2
<741.05
PZ-1
738
742.05
Staff Gage
x <733.61
PZ-4
Trail
OLYMPIC NATIONAL PARK BOUNDARY
TACOMA PUBLIC UTILITIES
OLYMPIC NATIONAL FOREST
Unimproved Road
N
0
300
Scale in Feet

Note: Lake Cushman water level at 715 ft. elevation. Lake is south of area shown on this figure

Note: Elevations relative to Cushman Dam Datum.

Source: TPU Survey Map & USGS 15' Quadrangle Mt. Skokomish, Lake Cushman, WA.

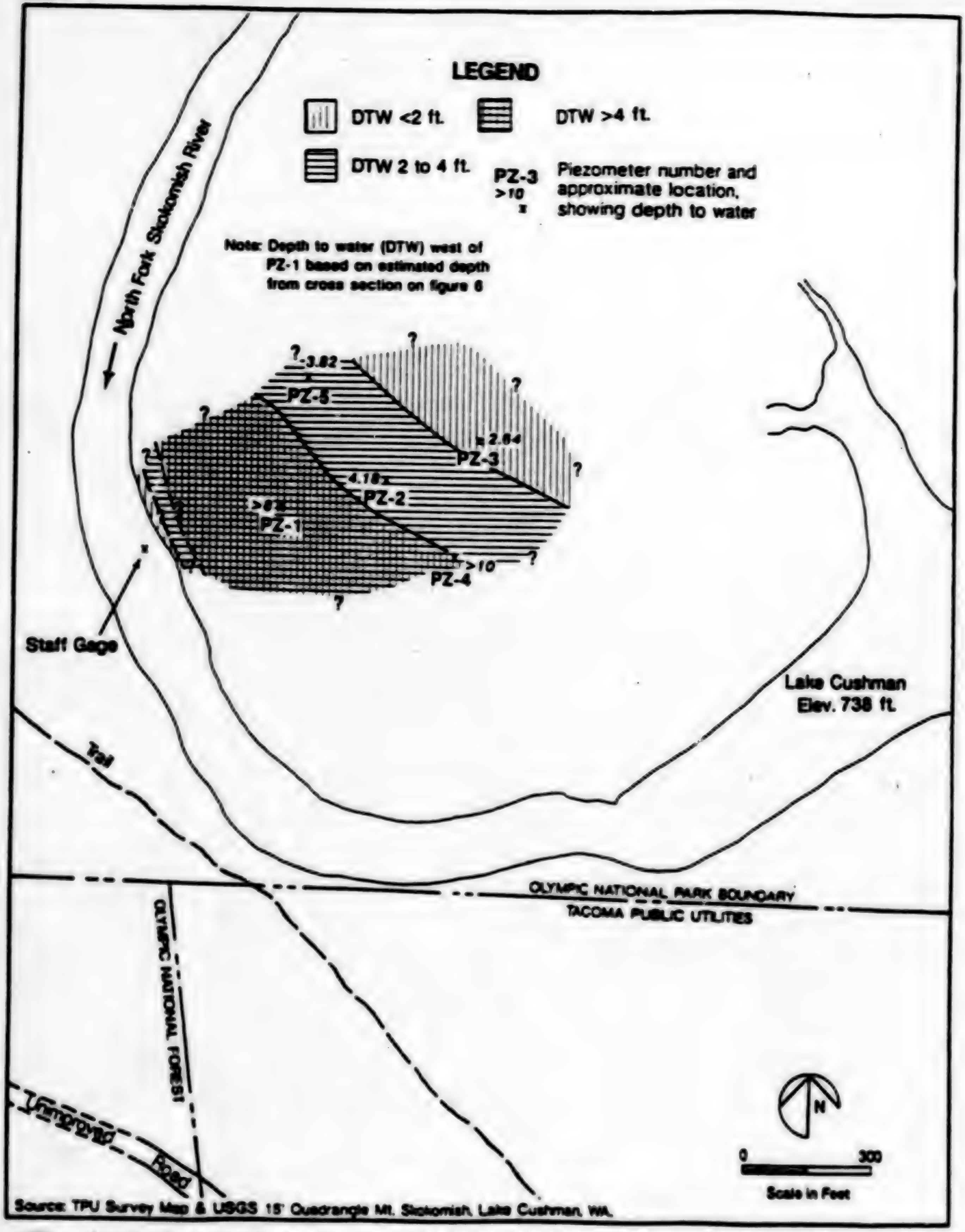
Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Groundwater Elevations October 30, 1991

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
15

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	DFF	MAB	1/2/92		


LEGEND
DTW <2 ft.
DTW >4 ft.
DTW 2 to 4 ft.
PZ-3
>10
Piezometer number and approximate location, showing depth to water
Note: Depth to water (DTW) west of PZ-1 based on estimated depth from cross section on figure 6
North Fork Skokomish River
3.82
PZ-5
2.84
PZ-3
4.18
PZ-2
>8
PZ-1
>10
PZ-4
?
Staff Gage
Lake Cushman
Elev. 738 ft.
Trail
OLYMPIC NATIONAL PARK BOUNDARY
TACOMA PUBLIC UTILITIES
OLYMPIC NATIONAL FOREST
Unimproved Road
N
0
300
Scale in Feet

Source: TPU Survey Map & USGS 15' Quadrangle Mt. Skokomish, Lake Cushman, WA.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

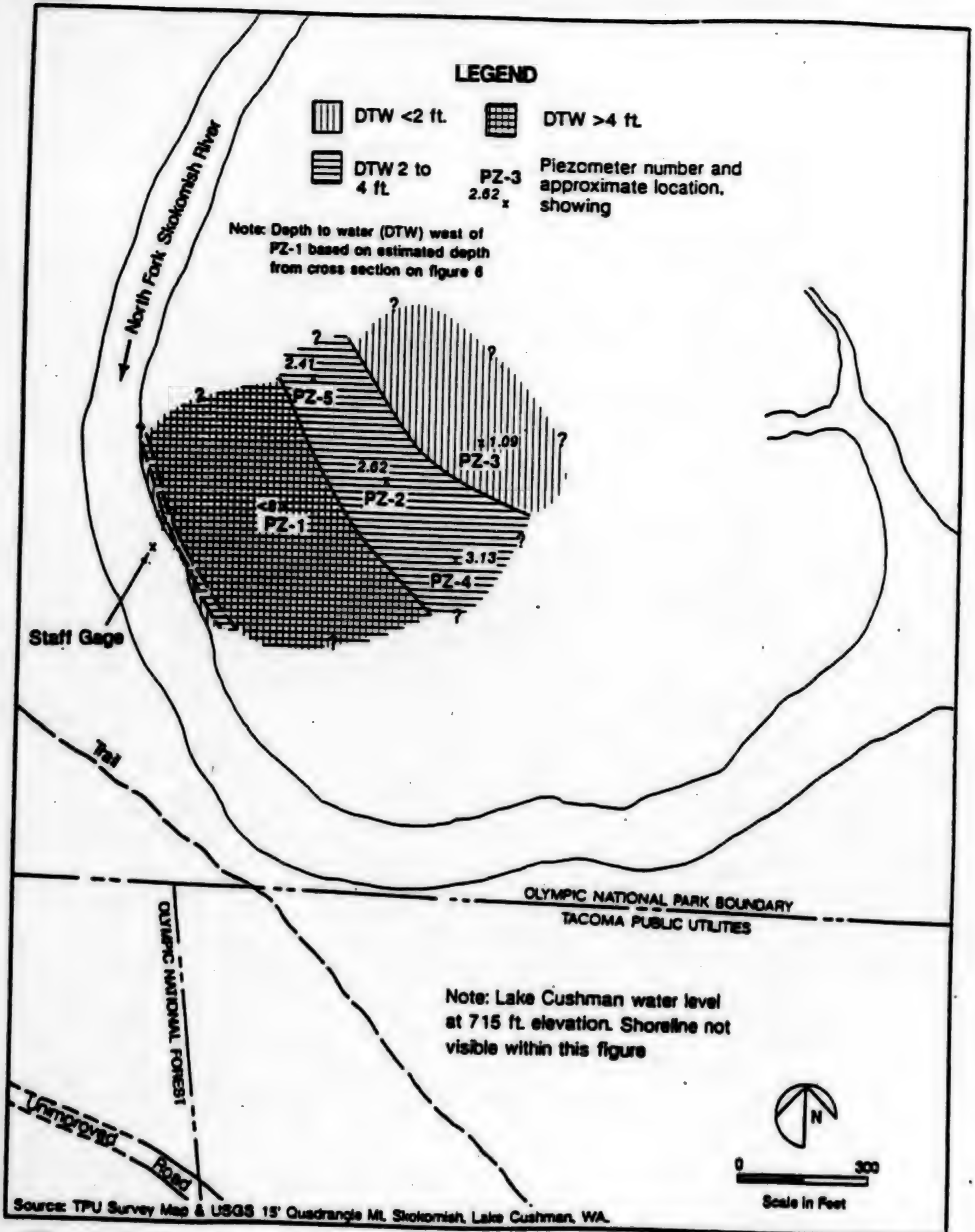
Depth To Water August 28, 1991

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
16

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15.589.001	DFF	MMZ	1/2/92		

541914


LEGEND
DTW <2 ft.
DTW >4 ft.
DTW 2 to 4 ft.
PZ-3
2.62 x
Piezometer number and approximate location, showing
Note: Depth to water (DTW) west of PZ-1 based on estimated depth from cross section on figure 6
North Fork Skokomish River
?
2.41
PZ-5
1.09
PZ-3
2.62
PZ-2
<8'
PZ-1
3.13
PZ-4
Staff Gage
Trail
OLYMPIC NATIONAL PARK BOUNDARY
TACOMA PUBLIC UTILITIES
OLYMPIC NATIONAL FOREST
Note: Lake Cushman water level at 715 ft. elevation. Shoreline not visible within this figure
N
0
300
Scale in Feet
Unimproved Road

Source: TPU Survey Map & USGS 15' Quadrangle Mt. Skokomish, Lake Cushman, WA.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Depth To Water October 30, 1991

Harza-TPU/Groundwater & Surface Water Interaction Study
Hoodsport, Washington

FIGURE
17

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	DFF	MMZ	1/2/92		

PLATES

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS MORE THAN HALF IS LARGER THAN NO. 200 SIEVE	**GRAVELS** MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	GW		WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 50% FINES	SW		WELL GRADED SANDS, GRAVELLY SANDS
			SP		POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC		CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN HALF IS SMALLER THAN NO. 200 SIEVE	**SILTS AND CLAYS** LIQUID LIMIT LESS THAN 50		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL		ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

LEGEND

SAMPLE

■ "Undisturbed"

▩ Bulk/Grab

◫ Not Recovered

▥ Recovered, Not Retained

CONTACT BETWEEN UNITS

——— Well Defined Change

／ Gradational Change

– – – Obscure Change

▬▬ End of Exploration

LABORATORY TESTS

Consol - Consolidation
LL - Liquid Limit
PL - Plastic Limit
Gs - Specific Gravity
SA - Size Analysis
TxS - Triaxial Shear
TxP - Triaxial Permeability
Perm - Permeability
Po - Porosity
MD - Moisture/Density
DS - Direct Shear
VS - Vane Shear
Comp - Compaction

UU - Unconsolidated, Undrained
CU - Consolidated, Undrained
CD - Consolidated, Drained

BLOWS/FOOT

Hammer is 140 pounds with 30-inch drop, unless otherwise noted
S - SPT Sampler (2.0-inch O.D.)
T - Thin Wall Sampler (2.8-inch Sample)
H - Split Barrel Sampler (2.4-inch Sample)

MOISTURE DESCRIPTION

Dry - Considerably less than optimum for compaction
Moist - Near optimum moisture content
Wet - Over optimum moisture content
Saturated - Below water table, in capillary zone, or in perched groundwater

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Soil Classification/Legend

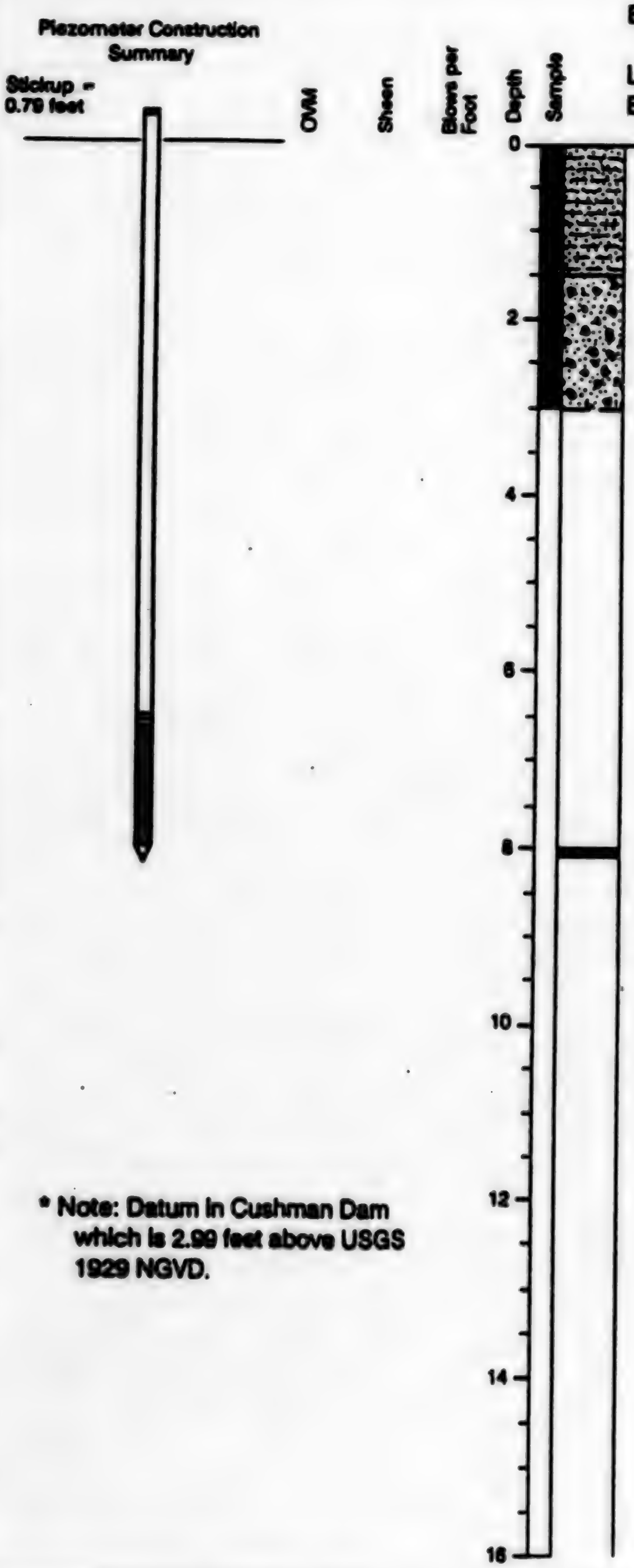
Harza - TPU/Groundwater and Surface Water Interaction Study
Hoodsport, Washington

PLATE
1

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	SES	MMZ	2 Jan. 92		

Equipment Hand Auger and Drive Point

Land Surface Elevation 749.05 feet* Date 8/28/91



DARK BROWN SILTY SAND (SM) medium dense, moist; fine to coarse grained, subangular to subrounded, with a trace of silt.

DARK BROWN SANDY GRAVEL (GP) medium dense, moist; coarse grained and subrounded, fine to coarse grained, subangular to subrounded sand, with a trace of silt.

Refusal met at 8.0 feet.

Drilled to a depth of 3 feet with the hand auger, piezometer driven to 8.0 feet.

* Note: Datum in Cushman Dam which is 2.99 feet above USGS 1929 NGVD.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Log of Piezometer 1

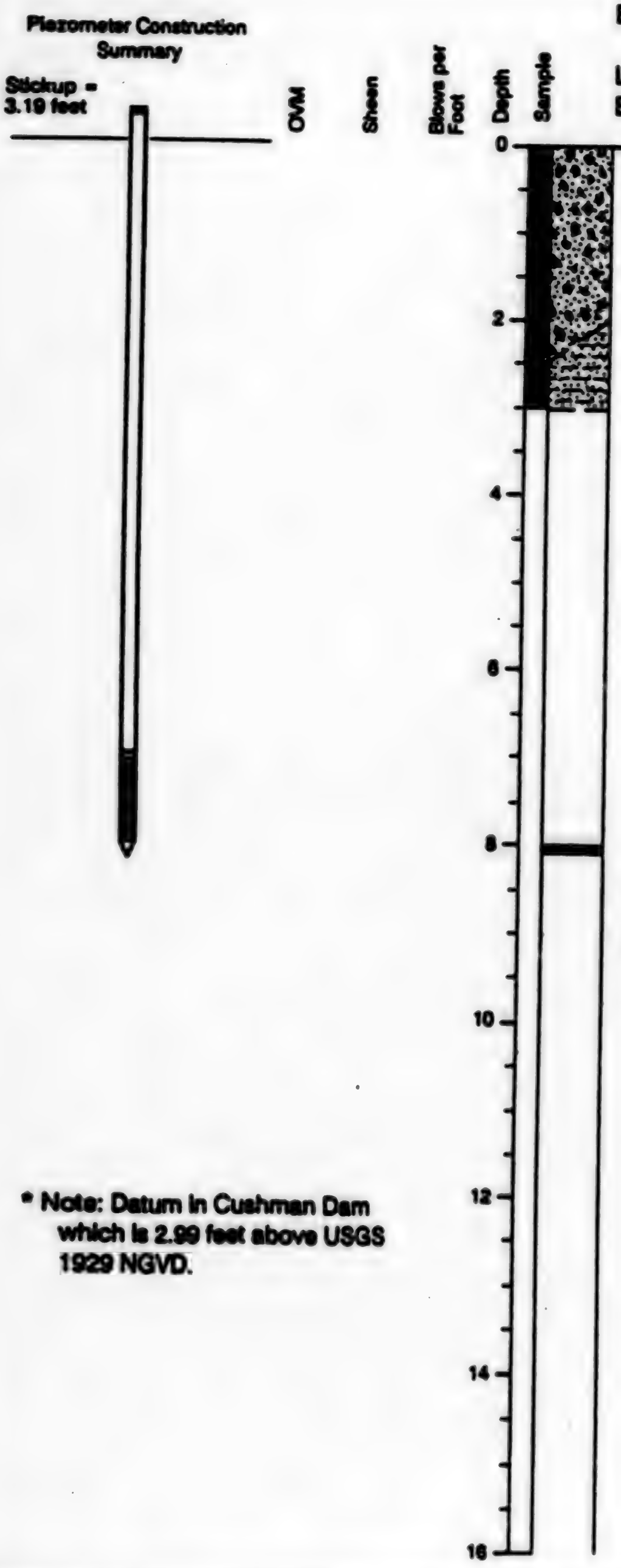
Harza-TPU/Groundwater and Surface Water Interaction Study
Hoodsport, Washington

PLATE **2**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	SES	MMZ	2 Jan. 92		

Equipment Hand Auger and Drive Point

Land Surface Elevation 743.42 Date 8/27/91



DARK BROWN SANDY GRAVEL (GP) medium dense, moist; coarse grained to 8" in diameter angular to subangular, fine to coarse grained, subrounded to rounded to occasionally subangular sand.

DARK BROWN SILTY SAND (SM) medium dense, moist; fine to coarse grained and subangular to subrounded.

Refusal met at 8.0 feet.

Drilled to a depth of 3 feet with the hand auger, piezometer driven to 8.0 feet.

* Note: Datum in Cushman Dam which is 2.99 feet above USGS 1929 NGVD.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Log of Piezometer 2

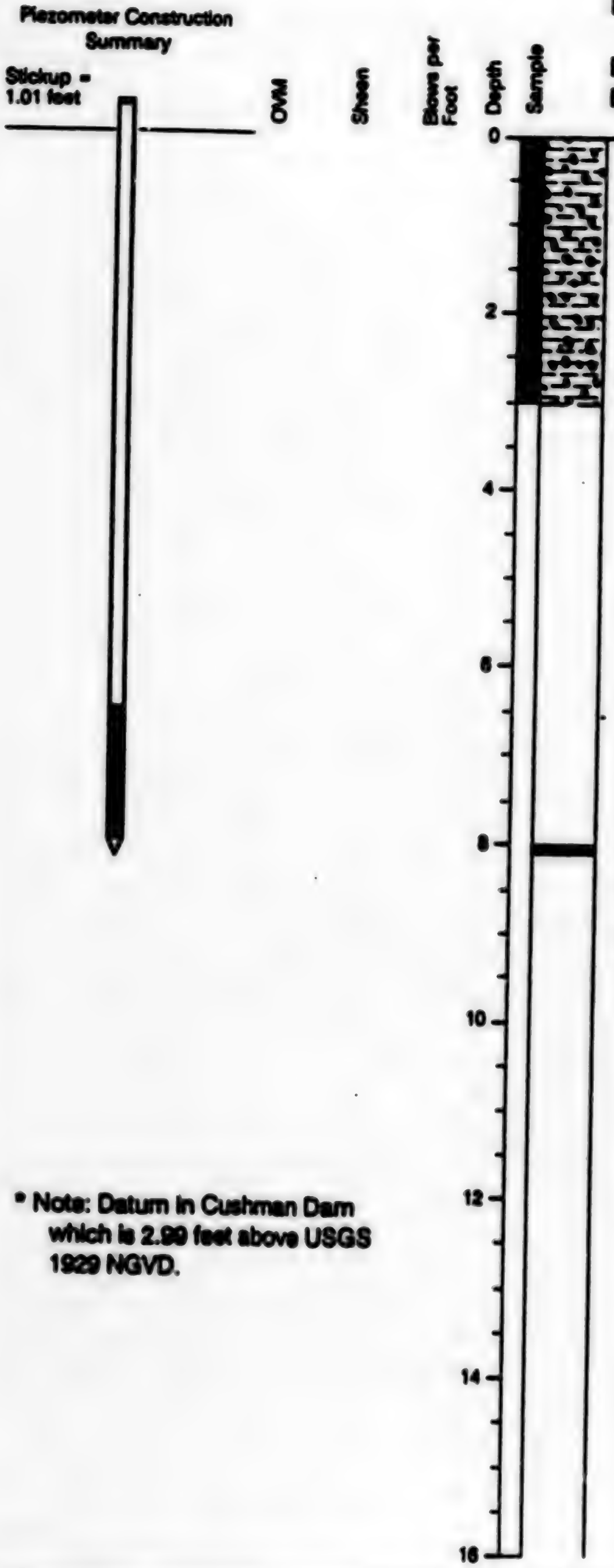
Harza-TPU/Groundwater and Surface Water Interaction Study
Hoodsport, Washington

PLATE
3

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,590.001	SES		2 Jan. 92		

Equipment Hand Auger and Drive Point

Land Surface Elevation 741.58 feet * Date 8/28/91



DARK BROWN SILTY GRAVEL (GM) medium dense, moist; fine to coarse grained, with some fine to medium grained, subrounded sand.

Refusal met at 8.0 feet.

Drilled to a depth of 3 feet with the hand auger, piezometer driven to 8.0 feet.

* Note: Datum in Cushman Dam which is 2.99 feet above USGS 1929 NGVD.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Log of Piezometer 3

Harza-TPU/Groundwater and Surface Water Interaction Study
Hoodsport, Washington

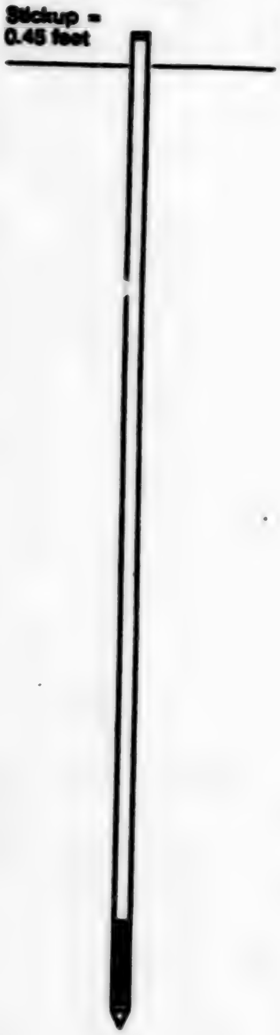
PLATE
4

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,569.001	SES	MMZ	2 Jan. 92		

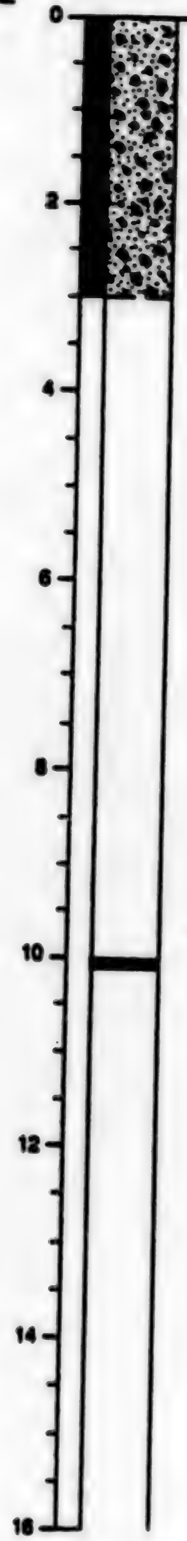
Equipment Hand Auger and Drive Point

Land Surface Elevation 743.16 feet* Date 8/28/91

Piezometer Construction Summary



OVM | Sheen | Blows per Foot | Depth | Sample



DARK BROWN SANDY GRAVEL(GP) medium dense, moist; fine to coarse grained and subrounded gravel, fine to coarse grained, subangular to subrounded sand, with some silt.

Drilled to a depth of 3 feet with the hand auger, piezometer driven to 10.0 feet.

* Note: Datum in Cushman Dam which is 2.99 feet above USGS 1929 NGVD.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Log of Piezometer 4

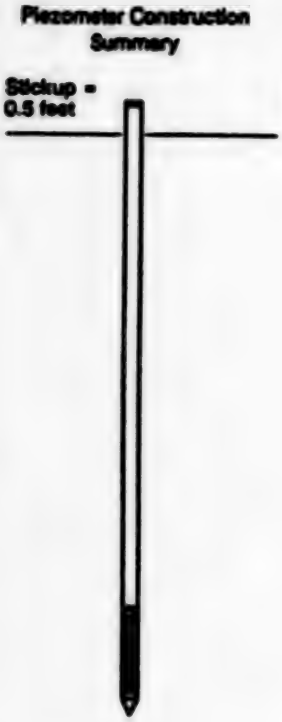
Harza-TPU/Groundwater and Surface Water Interaction Study
Hoodsport, Washington

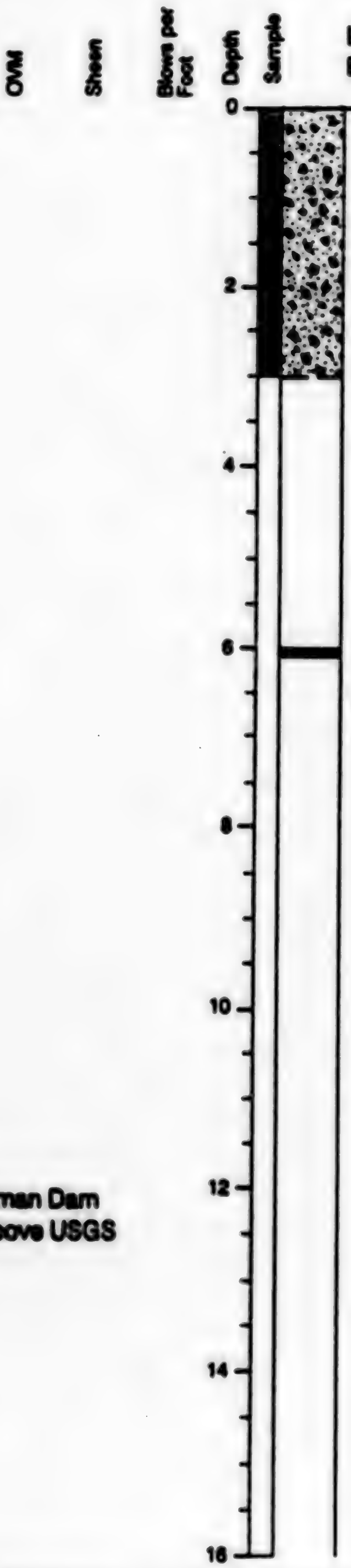
PLATE
5

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,889.001	SES	MMZ	2 Jan. 92		

Equipment Hand Auger and Drive Point

Land Surface Elevation 744.26 feet* Date 8/28/91





DARK BROWN SANDY GRAVEL (GP) medium dense, moist; fine to coarse grained and subrounded, fine to coarse grained, angular to subangular sand, with a trace of silt.

Refusal met at 6.0 feet.

Drilled to a depth of 3 feet with the hand auger, piezometer driven to 6.0 feet.

* Note: Datum in Cushman Dam which is 2.99 feet above USGS 1929 NGVD.

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

Log of Piezometer 5

Harza-TPU/Groundwater and Surface Water Interaction Study
Hoodsport, Washington

PLATE
6

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
15,599.001	SES	MMZ	2 Jan. 92		

Appendix E

Summary Report of Cultural Resource Surveys of Land Proposed for Deletion from Olympic National Park in vicinity of Cushman Reservoir.

Summary of Cultural Resources Surveys of Land Proposed for Deletion from the Staircase Ranger District of Olympic National Park

The Olympic National Park has conducted cultural resources surveys of approximately 30 acres of park land at the north end of Lake Cushman to initiate compliance with its obligations under Section 106 of the National Historic Preservation Act (NHPA). This summary of separate archeological and ethnographic surveys, as well as review of historic events, presents findings for each kind of cultural resource, identifies the concerns of a park-associated American Indian group, and describes the narrow focus of the ethnographic survey completed thus far. Finally, this summary refers to National Park Service (NPS) management policies and federal legislation in addition to NHPA, that will require further consultations in order to fully evaluate the potential impact of transferring the surveyed land from NPS management and control.

Historical Background

Exploration, Settlement, Recreation

Lake Cushman was named in 1852 by Benjamin F. Shaw, who was among the first group of settlers to establish homes on Puget Sound, after a friend, Orrington Cushman. By the late 1880s, there were several settlers around the lake. In early July, 1890, Lieutenant Joseph P. O'Neil noted that there was "no section of land not taken up or squatted on within 3 miles of the lake, or between the lake and Hoods Canal." That summer O'Neil led an exploring expedition of about 14 men, 11 mules, one horse, and one hound, carrying four tons of supplies and equipment, into the southern Olympics. O'Neil's group reached Lake Cushman after taking a steamer down Hood Canal from Port Townsend and cutting through a trail from Lilliwaup, only to discover that there was already a trail from Hoodsport to the lake. The expedition set up their first camp in a field, on a ranch on the northwest shore of the lake owned by a settler named Windhoffer. From there a trail already led about four and a half miles up the North Fork of the Skokomish to a copper mine near the base of Lightning Peak, close to the present park boundary. Just beyond this point the way was blocked by a bluff, and the explorers established Camp No. 2, or "Nellie Bly," about 500 yards beyond the miner's camp. O'Neil's party spent the next three months exploring a large portion of the southern Olympics and cutting a trail across the mountains to the Quinault.

The mine the explorers encountered above Lake Cushman had been started with the expectation of finding iron, but copper had been discovered instead. The miners had excavated a tunnel about 80 feet long, using a large cedar tree at the site for timbers. This may have been in the vicinity of the Brown Mule mine mentioned by Keatts.

Judge James Wickersham, entered the mountains from the Lake Cushman area and also explored portions of the eastern Olympics in 1889 and 1890. He recommended, as did O'Neil, that this area be set aside as a national park.

Six years after O'Neil's and Wickersham's expeditions, it was possible for a traveller to take a steamer from Seattle to Hoodsport, and a stage from Hoodsport almost to Lake Cushman. By this time there were two summer resorts on the lake, and the area was becoming a popular place to fish and to begin recreational excursions into the Olympics. In 1896, Russell Homan's Antlers resort consisted of two log summer cottages, one having twin towers at the front corners, with large porches and landscaped grounds. Cushman House resort was nearby. Several cabins had been built along O'Neil's trail as far as seven miles above the lake by settlers taking up timber claims. Both early resort establishments, as well as later ones, were inundated by the rising waters behind the Lake Cushman dam after its completion in 1926. In the 1930s the Staircase Resort was established near the present Staircase Ranger Station, and continued to operate into the 1950s. All but one of this resort's buildings have been removed.

None of the historic structures appear to be in the proposed exchange. The trail may/may not have gone through the exchange area. At present there appears to be no historic structures or historically significant locations in the exchange area. If the land exchange boundaries remain as at present, no additional historical review is recommended.

Archeological Survey Findings

Archeological sites have been documented outside of the park along the shores of Lake Cushman Reservoir; and in the park, up the South Fork of the Skokomish and up the Dosewallips. Archeological survey along the North Fork of the Skokomish is limited to recent surveys of the acreage proposed for deletion from the park through land exchange with Tacoma Public Utilities.

No archeological sites were located during the surveys of the proposed land exchange area.

Seasonal camps may have been common in the area. The specific land exchange area is composed of 1) gravel bars and 2) alluvial fans as part of an active channel and floodplain system. There is a low likelihood of finding sites with integrity in an area that is as geologically active.

If the final exchange area includes lands beyond the gravel bars and alluvial fans adjacent to the active channel and floodplain system, additional field survey should be done. If the land exchange boundaries remain as at present, no additional archeological survey is recommended.

Ethnographic Survey Findings

Ethnographic resources are recognized as a special class of cultural resources in NPS Management Policies that have importance to contemporary native American and other communities because of traditional associations and/or continuing uses that are "often essential to the survival of family, community, or regional cultural systems, including patterns of belief and economic and religious life" (NPS Management Policies 1988: Chapter 5:11).

One goal of the ethnographic component of the North Skokomish Cultural Survey was to identify specific populations that have either traditional associations with park resources and/or continuing uses of any natural or cultural resources within the park. Anthropological and historical literature indicates that the Skokomish Indian Tribe has traditional associations with the upper reaches of the North Fork Skokomish River drainage outside of the contemporary reservation. Some of the land is now formally owned by a public utility, while other land is under federal jurisdiction exercised through the NPS and the US Forest Service. Traditional Skokomish associations with this land are manifest in old village sites where ancestors once lived and the likely continuation of hunting, gathering, fishing and other social or ceremonial activities.

A second goal of the survey was to determine if certain ethnographic resources known to, or used by, contemporary Skokomish individuals might be located within the acreage proposed for deletion from the park. With the cooperation of Skokomish tribal officials, members of the Skokomish Cultural Committee, and other tribal members, park staff identified certain natural resources and areas within the park that are still used by tribal members and others valued because of either ancestral use or spiritual significance. One contemporary Skokomish use area is within the acreage proposed for deletion from the park, while six other areas are located nearby. Skokomish consultants are concerned that indirect impacts from fluctuating lake levels, changes in recreational uses, and the transfer of ownership and land management from the NPS to the public utility may threaten all ethnographic resources they identified.

With reference to Section 106 compliance alone, it is likely that certain of the ethnographic resources identified by the Skokomish may be "traditional cultural properties" eligible for inclusion in the National Register because of "association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (National Register Bulletin 38:1). However, because certain ethnographic resources are sacred places or discussions about them with outsiders are culturally sensitive topics, the decision to pursue determinations of eligibility to the National Register for any specific traditional cultural property must be made by the appropriate park-associated group. Additional consultations with the Skokomish are therefore necessary before either the use area within the thirty acre parcel, or other places in the park, are documented further and considered for nomination to the National Register under Section 106.

In addition to addressing the NHPA and NPS Management Policies referred to above, the NPS must also consider pertinent aspects of other federal laws, including the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, and the National Environmental Policy Act to fully assess the potential impact of the proposed action. Under the laws cited, the NPS, as a federal agency within the Department of the Interior, has special obligations to document, evaluate, and manage the natural environment, cultural resources, and any social uses of land within its jurisdiction.

Because there is at least one culturally sensitive area within the exchange area, additional consultation with the Skokomish is required prior to any exchange. The object of the consultation will be to determine steps appropriate to the treatment and protection of the culturally sensitive area.

References

Maring, C. C., "In the Olympic Mountains," Recreation, vol. 8 (Feb. 1898), pp. 87-97.

O'Neil, Joseph P., 1896, "Report of the Exploration of the Olympic Mountains, Washington," 54th Congress, U. S. Senate Document No. 59.

Wood, Robert L., Men, Mules and Mountains: Lieutenant O'Neil's Olympic Expeditions. Seattle: The Mountaineers, 1976.

Wray, Jacilee, and York, Dr. Frederick F., Nov. 14, 1991, "North Skokomish Cultural Survey," Olympic National Park Service/Pacific Northwest Region

Appendix F

Scoping Process: Final Report, and Products.

FINAL REPORT

Public Involvement and Information Program for an

Environmental Assessment of a Proposed Land Exchange at Lake Cushman

JULY 10, 1992

Table of Contents

Introduction 1

Interviews 3

Summary of Public Scoping Meetings 7

Summary of Issues Raised in Written Comments............. 13

Olympic National Park and Tacoma Public Utilities retained Triangle Associates, Inc. to assist in gathering comments from the public on the range of issues related to the possible environmental impacts of the proposed land exchange. This final report is a product of that contract.

INTRODUCTION

PROJECT BACKGROUND

Tacoma Public Utilities (TPU), which is licensed by the Federal Energy Regulatory Commission (FERC), operates two dams on the North Fork Skokomish River, southeast of Olympic National Park (ONP). Historically, TPU has maintained the reservoir behind the upper dam, also known as Lake Cushman, at 738 feet during the summer under normal operating conditions. When the Lake is at the 738 level, however, the Lake floods approximately 11 acres of land that is within the boundaries of ONP. TPU has filed an application for a new operating license with FERC, requesting to retain the current operational level at 738 feet. TPU is also required by FERC to control lands up to the 742 foot level in case of emergency operation conditions.

The National Park Service maintains that FERC has no authority to authorize inundation of Park lands, and that this inundation constitutes trespass. TPU has been directed by FERC to resolve the trespass issue pursuant to licensing.

The proposed resolution to this issue is to exchange Park lands at the head of Lake Cushman (approximately 30 acres) which includes the 11 acres that are subject to flooding, for land which is owned by the Washington Department of Natural Resources (DNR) inside the Park boundary in the Soleduck area (approximately 40 acres) plus 5 acres in the Quileute area near La Push. Under this proposal, TPU would purchase the DNR lands, then exchange this land with the National Park Service for the 30 acres at the head of Lake Cushman. Congressional legislation would then be required to authorize the Secretary of the Interior to change the boundary of ONP to reflect the land exchange.

PURPOSE OF PUBLIC INVOLVEMENT AND INFORMATION PROGRAM

Olympic National Park has sought comment from the public and from affected governments and agencies concerning possible environmental impacts associated with a proposed land exchange with the City of Tacoma. ONP and TPU retained an independent consultant, Triangle Associates, Inc. of Seattle, WA to assist in gathering comments from the public on the range of issues related to the possible environmental impacts of the proposed land exchange. Triangle Associates conducted interviews with representatives of state and federal agencies and the Skokomish Tribe with environmental responsibilities in the Lake Cushman area,, produced a newsletter describing the project and inviting public comment on it, facilitated two public meetings, and gathered and summarized public comments on the proposed land exchange. The comments received through this public involvement and information program will inform an Environmental Assessment on the proposed project.

SUMMARY OF FINAL REPORT

This final report on the Public Involvement and Information Program includes the following elements:

- Summary of interviews conducted with governmental agencies with environmental responsibilities in the project area,
- Summary of two public scoping meetings,
- Summary of issues and concerns raised in written comments on the project,

INTERVIEWS

SUMMARY OF INTERVIEWS

Members of the Cushman Coordinating Committee (CCC) were interviewed by Triangle Associates during April, May and June, 1992. The Committee is comprised of Tacoma Public Utilities, supporting its FERC licensing process, and the federal, state and tribal agencies representing resources other than hydroelectric power, such as fish and wildlife. The interviewees represented these organizations:

- Bureau of Indian Affairs
- Mason County Planning Department
- National Marine Fisheries Service
- Olympic National Park
- Skokomish Indian Tribe
- Tacoma Public Utilities
- U.S. Forest Service
- U.S. Fish and Wildlife Service
- Washington Department of Ecology
- Washington Department of Wildlife

These questions were asked of each interviewee:

1. Please tell me about the history of the project and your organization's involvement in it.
2. What do you think the key issues and concerns associated with the land exchange are?
3. Have you or your agency identified any potential impacts associated with the proposed land exchange? (If yes) Please describe.
4. Which groups or individuals should we be sure to send the project newsletter to so they know about the scoping meeting and their opportunity to send written comments in connection with the Environmental Assessment?
5. What other issues or factors should we be aware of as we develop public information and involvement opportunities for this project?
6. Are there any other thoughts about the project that you would like to offer?

SUMMARY OF RESPONSES

During the public meetings held on June 10 & 11, 1992, the proponents of the land exchange made detailed presentations on the proposed land exchange which are summarized in this report on pages 10-12. Additional responses from the interviews are summarized here:

- **OLYMPIC NATIONAL PARK**
  The main goal is the resolution of this jurisdictional dispute, while reaching agreement on the various issues of concern:
  - Elk mitigation
  - Protection of fish, spotted owl and bald eagle habitat
  - Protection of the Skokomish Tribe's cultural values
  - Protection of the "gateway to the wilderness" park use of the area. Recreational use at the lake is not a priority for the Park in this area.

- **TACOMA PUBLIC UTILITIES**
  The land exchange should be unnecessary, since the City of Tacoma was given the right in 1924 to flood the lands to 738'. The 742' level is a requirement for flood control only. The current proposal should not be compared with pre-dam realities. The only thing that will change is on a piece of paper, because TPU will manage the land precisely as the Park has been managing it.

Responses of the other Cushman Coordinating Committee members are summarized here:

- **FERC PROCESS**
  Several agency representatives expressed concern about exchanging the lands until the Lake Cushman hydroelectric project FERC licensing process is complete:

  - All parties' interests could be served holistically if dealt with as part of the FERC licensing process which will have a comprehensive perspective. "Piecemealing" will circumvent the NEPA process.

  - The TPU project has had problems with spills, flooding downstream and other hydroelectric management issues. Any prior decision on the proposed land exchange cannot be fully informed, and may foreclose any project operation changes that might otherwise result from the FERC process.

  - An Environmental Impact Statement should be conducted as part of the FERC process and should cover this land exchange issue

- **SKOKOMISH TRIBAL INTERESTS**
  Tribal representatives described two major areas of concern in addition to their strong admonishment to wait until the FERC licensing process was completed:

  - Skokomish Tribal environmental interests, reserved for them by treaty, are focused in the Skokomish watershed. Consequently, an exchange of lands outside the watershed constitutes an environmental loss of fish and wildlife resources for the Tribe. Any mitigation must be site specific, and of interest to the Skokomish Tribe.

  - At the headwaters of the Lake is devil's club, skunk cabbage, and cascara, and the other features such as old growth and fresh water, necessary for cultural practices by Skokomish Tribal members. Archaeological studies of the inundated areas have been very limited. The proposed land exchange damages the Skokomish Tribe's ability to ensure that these resources are sustained and/or recovered.

- **ENVIRONMENTAL VALUE OF EXCHANGE LANDS**
  Two agency representatives were concerned that there has been no thorough analysis of the exchange lands. There should be an environmental review of the fish and wildlife values of the property in the Soleduck and La Push exchange areas. Without this step the Environmental Assessment will be too narrow and therefore flawed.

- **LAKE LEVEL FLUCTUATION**
  Additional concerns were expressed about the amount of fluctuation in the reservoir level. The large fluctuations are not good for biological integrity, creating a zone that cannot establish bioreproduction of vegetation in the riparian zone. One suggested there needs to be an analysis showing specific criteria for choosing each reservoir operating level.

- **FISH**
  The dolly varden or bull trout and other anadromous fish stocks in the Skokomish River are of concern to several of the agencies and the Skokomish Tribe. They are sensitive species, and are affected by the changing levels of the lake in the current management regime.

- **ELK**
  Currently protected (from hunting) elk habitat in the Skokomish River basin is being traded for acreage in another river basin. A point was raised by three representatives that this proposed land exchange abandons the Skokomish basin elk herds to hunters. What specifically will be done by TPU to protect them? Also, the elk study, commissioned by the proponents of the land exchange assumes that there will be no change in the hydro project operation or design as a result of the FERC process, and assumes that the reservoir level will remain the same. The alternatives to this operation regime are not addressed in the study.

- **THREATENED AND ENDANGERED SPECIES AND PROPOSED THREATENED AND ENDANGERED SPECIES**
  The U.S. Fish and Wildlife Service representative pointed out that the spotted owl and bald eagle (T&E) and the marbled murrelet (PT&E) are known to be in the area. An official request, called a Species Request, should be made to the Fish & Wildlife Service

for a list describing the Threatened and Endangered species in the area. (It will take 30 days to receive.)

- **ENVIRONMENTAL MANAGEMENT**
  The issue was raised that the City of Tacoma has not demonstrated the ability to manage their lands that are on the North Shore of Lake Cushman; fire, nuisance, sanitation and litter are all serious existing environmental management problems. What kind of assurance can the City of Tacoma (TPU) provide that these problems will not continue there and extend to the area proposed to be exchanged?

- **OTHER ISSUES**

  - People who live along the Lake, lessees of the Development Company, are affected because of the loss of lake level which affects their access to the lake, docks and floats.

  - This proposed exchange may become a precedent, sacrificing a piece of a National Park for the interests of a utility that serves just part of the population.

SUMMARY of PUBLIC SCOPING MEETINGS

SUMMARY OF PUBLIC SCOPING MEETINGS

On June 10 and 11, 1992, two Open House/Public Meetings sponsored by Olympic National Park (ONP) and Tacoma Public Utilities (TPU) were held in Olympia and Hoodsport. The purpose of the meetings was to inform the public about and to seek public comment on the range or scope of issues related to the possible environmental impacts of a proposed land exchange between ONP and TPU.

The first meeting was held in Olympia, WA on June 10, 1992 at the Olympia High School Cafeteria. There were 147 members of the public who signed in at the meeting. Two representatives of organized groups and 10 members of the public offered oral comments. The second meeting was held in Hoodsport, WA on June 11, 1992 at the Hoodsport Community and Fire Hall. There were 189 members of the public who signed in at the meeting. One elected official, one representative of a tribal government, 3 representatives of organized groups and 8 individuals offered oral comments.

At both meetings, a similar format was followed. Triangle Associates, Inc. facilitated both public meetings and collected written comments from the public. At 6:00 PM, members of the public viewed displays and maps showing the lands to be exchanged and spoke with representatives of Olympic National Park and Tacoma Public Utilities. At 7:00 PM, the scoping meetings began with presentations by Garth Jackson, Resource Development Coordinator for TPU and John Aho, Division Chief of Science Program at ONP. Their presentations are summarized below. Following the presentations, members of the public were invited to make oral comment on the proposed land exchange.

HISTORICAL BACKGROUND -- Garth Jackson, Tacoma Public Utilities

In the early 1920's, the City of Tacoma began exploring the possibility of establishing a hydroelectric project on the Skokomish River to meet the area's growing demands for electricity. By 1924, the City had acquired a "minor part" license, the only licensing required at the time, because the project would border U.S. Forest Service lands. The original survey of the area mapped out where along the terrain the new reservoir would reach when filled to its summer operating level of 738 feet (Cushman datum). Unfortunately, the original survey inaccurately predicted the extent of the inundation of land at the head of the lake. This error was not discovered until the relicensing of the project began in the 1970's.

In 1974, the original license expired and TPU applied to the Federal Energy Regulatory Commission (FERC) for a new license to operate the Cushman project. During this relicensing process, which has gone on for eighteen years, FERC required TPU to create new maps of the project. These maps showed that 11 acres of Olympic National Park (established in 1937) were inundated by the reservoir when filled to the historic 738 foot level. In 1988, ONP determined that this constituted trespass on park lands by TPU. Rather than turn the matter over to lawyers, ONP and TPU agreed to negotiate a settlement to this dispute. At present, three separate processes are involved in resolving the dispute:

- First, the relicensing of the entire project by FERC involving an environmental impact statement (EIS) which will determine the operating level of the reservoir;
- Second, the environmental review of the proposed land exchange with ONP that would change the ownership of the inundated lands to end the trespass; and,
- Third, the passage of legislation in Congress required to change the boundary of the Park and remove the 30 acres at the head of Lake Cushman from the Park.

Jackson stated that even though the situation is complicated, TPU is confident that the issues will be resolved soon. The legislation is close to passage in the Senate and House, the environmental review is close to being completed, and with the completion of the FERC licensing EIS, things will fall into place.

ENVIRONMENTAL ASSESSMENT OF THE PROPOSED LAND EXCHANGE - John Aho, Olympic National Park

Before the land exchange can be approved or rejected, the Park must comply with the National Environmental Policy Act (NEPA) and conduct an environmental review. This will produce an environmental assessment, examining cultural, natural resource, and recreational issues that will be affected by the proposed land exchange. The comments collected from the public will be included in the environmental assessment.

Several studies have been undertaken, anticipating the need for information to prepare the assessment. Here are some of the results reported.

Cultural Issues: Archaeological and ethnographic studies have reported no physical evidence of historic use of the 30 acres in question by the Skokomish Tribe (or the Twano peoples). However, it appears that the property is part of a larger area used by the Skokomish, and so has cultural values beyond the scope of the planned assessment. These values should be addressed in the FERC licensing environmental review process.

Natural Resource: The area is rich in resources which include fish, bald eagles and spotted owls. A study by Raedecke Associates of the elk that have historically used this area indicated that the park property is not crucial to the survival of the herd. Instead, the critical factor may be hunting pressure.

A park biologist surveyed the fish spawning and found that the Bull Trout (which is listed as "sensitive" by the U.S. Fish and Wildlife Service) uses the river reaches above the reservoir, as do the resident chinook salmon (an important recreational resource).

No spotted owls occupy the lands at the head of the reservoir. A pair of owls is territorial within the near Dry Creek drainage, so consultation with the USFWS about owls has been initiated.

The hydrology of the area is a concern. The level of the reservoir affects elk habitat up to the limit of the flooded area, but does not appear to affect the water table above the reservoir.

Proposed Land Exchange: Even though only 11 acres are inundated, the Park proposes to exchange 30 acres in order to achieve a stable and recognizable boundary. None of the 30 acres has stands of old growth forest.

As the river flow responds to storm hydrologic events or snowmelt runoff, the river carves new channels and deposits fresh gravel and other sediments, causing any legal survey of a boundary in this area to be almost useless. The proposed action will establish a boundary not along the contour of the land, but, instead, as a straight line between fixed, known points above the most unstable area.

Lands to be acquired by the Park are within the Congressionally authorized boundary, and are currently owned by the State and managed by the Washington Department of Natural resources. These include 40 acres in the Soleduck Valley, and 5 acres in the Quileute area. The Soleduck parcel has mature, second growth forest and is good wildlife habitat. The Quileute parcel was logged more recently and is immature, mixed forest habitat. The intention is for Tacoma to purchase these lands from the State, then exchange them with the Park for the 30 acres at the head of Cushman Reservoir.

"Connectedness" to the broader environmental concerns relating to the Project licensing by FERC will be discussed in the Park's EA. An EIS just for the proposed land exchange is not anticipated, as the Park will "tier" its EA with the FERC environmental review process, which will produce an EIS.

COMMENTS FROM PUBLIC MEETINGS

Following the presentations, the floor was opened to comment first by elected officials, then representatives of organized groups and finally to individual citizens. At the first meeting in Olympia, no elected officials spoke. The groups represented in Olympia were the Save Our Lake Committee and the Olympic Park Associates. Ten individuals offered oral comment.

At the second meeting, the speakers included one elected official, Mason County Commissioner Bill Hunter, a representative of the Skokomish Tribal government, Victor Martino, three representatives of organized groups (Save Our Lake Committee, Olympic Park Associates, and the Cushman Maintenance Company Board of Trustees) and eight members of the public. The issues raised by the speakers at both meetings are summarized below.

The majority of the people who attended the meetings seemed to be lessees of land in the Lake Cushman area. Their main concern, expressed many times, was that the level of the lake be restored to the 738 foot level. Although other reasons were listed by some of the speakers, the support for the land exchange by the lessees seemed to be grounded in the proposal's assumption of a 738 foot operating level.

Some of the speakers expressed their support or opposition to the land exchange itself, listing many and varied reasons. Others spoke of the values to residents, visitors and wildlife associated with Lake Cushman when it is filled to the 738 foot level.. Many gave personal histories of how they and their families have treasured the lake, listing the consequences to themselves and to the environment that would result if the lake were lowered. A representative of the Skokomish Indian Tribe identified the tribe's concerns. Some people expressed their concerns about the process. Comments on this range of issues are categorized and listed below.

Those who spoke in favor of the land exchange gave the following reasons:

- It would keep the lake at the 738 foot level.
- It would eliminate the trespass and prevent the Park from forcing TPU to lower the lake.
- They trust TPU to live up to its promise to manage the land in the same way as ONP.
- It would prevent a long legal battle over the issue.
- It would not hurt or change the environment for the wildlife or the residents.
- The Park would get valuable land in exchange and see a net increase in acreage.
- It would maintain the recreational uses of the lake, including fishing, boating and swimming.
- If it would keep the lake up to 738 feet, then it would save fish habitat at the head of the lake and in the State Park.

Those who opposed the land exchange gave the following reasons:

- ONP would no longer control the use of the land at the head of the lake.
- Wildlife would not be protected by the Park.
- A full EIS is necessary to examine the deletion of Park lands.
- The decision on the land exchange should wait until all the issues are considered at one time in the FERC EIS, in order to make a well-informed decision.
- The land exchange does not set the water level; and it should not be completed until the water level is set in the FERC EIS.
- The exchange lands should be private holdings in the Park, not other publicly held lands.
- The exchange lands should be in the same valley as the inundated land to maintain habitat for the elk.

Environmental consequences of lowering Lake Cushman:

- Lowering the lake would destroy fish habitat in the shallows at the head of the lake and near the State Park.
- It would eliminate shady areas for fish by moving the edge of the lake out from under the trees along the current shore.
- A lower lake would leave 100 to 300 acres of barren, ugly and dangerous stumps and mud exposed like a "dirty bath tub ring" around the lake and would destroy much of the beauty associated with the lake.
- Wildlife would be exposed to danger from predators if they had to cross the barren mud to drink from the lake.

Cultural/recreational consequences of lowering Lake Cushman:

- Many people felt that their family traditions of living near the lake or vacationing at the lake would be destroyed if the lake were lowered.
- Swimming would be hazardous because shallow areas would be eliminated, especially at the State Park.
- Boating would be hazardous due to exposed stumps.
- The recreational value of the lake would be decreased, therefore putting more pressure on the Park by people who would no longer use the lake.

Financial consequences of lowering the lake:

- A lower lake would cause a drop in property values for residents, estimated by one speaker as at least $1000 per lot, times 3000 lots, or at least $3 million.
- A drop in the property values would reduce tax receipts for Mason County and the State from leasehold taxes and personal property taxes.
- To lower the lake permanently would leave docks high and dry and cost residents thousands of dollars to replace or repair.
- The bulkheads that many people have built to prevent erosion would be worthless.
- The $100,000 spent on new docks in the last five years by the Lake Cushman Maintenance Company would have been wasted.

Environmental values of Lake Cushman at the 738 foot level:

- The area is uniquely beautiful when the lake is full.
- The lake provides habitat for elk, eagles, fish, deer, and other wildlife.
- A full lake is an asset to the Park because it adds beauty to the approach to the Staircase area.

Cultural, recreational and financial values of Lake Cushman at the 738 foot level:

- Lake Cushman has provided a scenic place for seniors to retire to.
- The community around the lake is growing more balanced as younger families with children move there.
- The recreational opportunities of camping, fishing, boating, swimming, etc. that are enjoyed by thousands of visitors and residents every year.
- The visitors and residents support dozens of businesses around the lake, including those on the Skokomish Indian reservation.
- The project provides a clean source of power for the City of Tacoma.
- The residents pay both leasehold taxes and personal property taxes to Mason County and the State.

Concerns for the Skokomish Indian Tribe:

- The tribe should be treated fairly in the process.
- The tribe has lived along the river for thousands of years and has reserved rights to fish and hunt at all their "usual and accustomed places" guaranteed when they ceded land to the federal government.
- The fish runs that the tribe depended on year round were decimated when the project was first built and the river was dammed.
- TPU does not allow enough water through the channel to clear out the sediment, therefore creating increased flooding dangers.
- There have been sudden releases of water with no notice to those who live downstream.
- When the project was built in the 1920's, no provisions were made for fish to get upstream to spawn.
- The tribe would like all issues to be considered at the same time in the FERC EIS, so that an informed decision can be made.
- The tribe has no official position on the lake level.

Complaints about the process:

- ONP had no right to insist that the lake be lowered because the reservoir was created before the Park was established and President Roosevelt declared that the Park would not infringe on existing uses.
- The process has taken too long; it should not be dragged out any longer.
- The Park is trying to tell the residents how to live their lives.
- Superintendent Finnerty did not attend the meetings in Olympia or Hoodsport.
- The FERC process has taken much too long (18 years).
- The whole ordeal has destroyed many people's faith in the government.

PETITION AND CHARTS

During the June 11 meeting, a member of the public submitted a petition with 290 signatures and two charts which he used as visual aids during his comments. The petition read "SAVE LAKE CUSHMAN: We, the undersigned, have been advised that there is currently legislation before Congress to exchange properties in order to effect the future filling and utilization of Lake Cushman. By signing below, I request that immediate action be taken to effect legislation to ensure the proper filling and utilization of the Lake." The charts document one estimate of the financial consequences that may result if the lake were permanently lowered. The petition and the charts are on file with the written comment sheets and letters at Olympic National Park.

SUMMARY of ISSUES RAISED IN WRITTEN COMMENTS

SUMMARY OF ISSUES RAISED IN WRITTEN COMMENTS

In a project newsletter and at both public meetings held in June 1992, Olympic National Park (ONP) and Tacoma Public Utilities (TPU) invited the public to submit written comments on the proposed land exchange between ONP and TPU. These written comments were submitted in the form of comment sheets distributed at the meetings or letters mailed in by June 25, 1992. A total of ninety-one letters and comment sheets were submitted by elected officials and the Skokomish tribal government, organized groups, individuals, groups of individuals, and families. The issues and concerns raised in the comment sheets and letters are summarized below. The letters themselves will be kept on file at Olympic National Park.

COMMENTS FROM ELECTED OFFICIALS AND TRIBAL GOVERNMENTS

All four letters received from elected officials expressed support for the land exchange. Two of the letters, from U.S. Senator Slade Gorton and WA State Senator Brad Owens were read at the public meetings and submitted for the record by Lou Mott, a representative of the Save Our Lake Committee. Mason County Commissioner Bill Hunter read a statement at the June 11 meeting and submitted it for the record. WA State Representative Tim Sheldon (35th District) submitted a letter supporting the land exchange.

Skokomish Indian Tribe

The letter from the Skokomish Indian Tribe outlined the history of the tribe in the Skokomish Valley and the tribe's original and continued opposition to the Cushman hydroelectric project. Their letter described how the "Cushman Project dams and diversion (of the North Fork of the Skokomish River) have destroyed important tribal fishing, hunting, gathering, ceremonial and religious sites." The tribe listed several issues which they felt ought to be addressed in the Environmental Assessment. These included environmental issues, cultural issues, tribal treaty rights and responsibilities, and legal issues.

Suggestions made by the tribe related to environmental & cultural issues to be examined in the Environmental Assessment:

- Assess the relationship between this process and the FERC EIS.
- Identify and evaluate alternatives that would make the proposed action unnecessary.
- Examine the Cushman Project boundaries under 1924 FERC minor part license and describe in detail Park lands to be affected by flooding and associated environmental impacts.
- Examine the effect on wildlife and people of flooding to the 742 elevation.
- Document why the land at the head of the reservoir was added to the Park and assess how deleting it would affect the value of the Park.
- Assess the impacts to fish, wildlife, cultural and other environmental values from the trespass on and use of ONP lands and Forest Service lands for the past half century.
- Evaluate the effect on reservoir operations of instream flow releases below Dam No. 2 necessary to rehabilitate fish habitat conditions, etc.

- Fully investigate the effects of the proposed action on the tribe's continued cultural and spiritual use upstream.
- Identify and assess alternatives to the particular lands identified for exchange proposed.
- Assess how the proposed action would affect public recreation and the land surrounding the reservoir that is committed to private use by Tacoma leaseholders.

Suggestions concerning tribal rights and legal issues to be examined in the Environmental Assessment:

- Investigate the effects of the proposed action and alternatives on the treaty rights and reservation lands of the tribe; address the trust responsibility of federal agencies to protect rights of the Skokomish Tribe.
- Investigate compliance of the Cushman reservoir at normal and proposed maximum flood levels with state regulations regarding reservoirs and water storage capacity.
- Examine the loss of federal protections for fish, wildlife and cultural resources, and for cultural uses by the tribe under the American Indian Religious Freedom Act, presently afforded to Park lands proposed for transfer out of the Park.
- Analyze the effect of Congressional legislation required to change Park boundaries for compliance with the National Environmental Policy Act.

COMMENTS FROM ORGANIZED GROUPS

Four letters from organized groups were received. The letter from the Lake Cushman Maintenance Co. expressed support for "a land exchange agreement in favor of full use of Lake Cushman" on behalf of the more than 2000 lessees of land surrounding Lake Cushman.

The two letters from Sierra Club chapters, the Cascade Chapter and the Twanoh Group, stated that the "Sierra Club is generally supportive" of the land exchange, but had a number of concerns that need to be addressed in the Environmental Assessment (EA). These concerns included:

- The belief that further justification needs to be made for transferring 19 additional acres of Park land to TPU.
- The legislation changing the Park boundary must require TPU to "manage the 30 acres EXACTLY as the National Park Service."
- The need for original research to be done on the elk habitat at the head of Lake Cushman.
- The need to raise the reservoir level to 738' to preserve fish habitat.
- The belief that "the lands identified for exchange are inappropriate" and that private lands within the Park be identified for exchange.

The letter from the Olympic Park Associates expressed concerns similar to those listed above for the Sierra Club. They also stated their feeling that a "full Environmental Impact Assessment is required for the proposal for deleting any part of Olympic National Park." They also requested that the EA be "upgraded" to an Environmental Impact Statement.

COMMENTS FROM MEMBERS OF THE PUBLIC

The letters submitted by members of the public echoed the concerns addressed at the June 10th and 11th meetings which are summarized in the preceding section of this report. Eighty-two letters and comment sheets were submitted, representing 121 signatures. The issues and concerns identified in written comments by members of the public are summarized below. As at the meetings, the majority of respondents were lessees of land in the Lake Cushman area. The one concern addressed most often was the level of the lake, i.e. the residents' concerns that the lake be permanently set at 738 feet.

Letters in support of the proposed land exchange

Forty-two letters in favor of the proposed land exchange were from people who identified themselves as leaseholders or property owners in the Lake Cushman area. Representative comments included:

- "I am fully in favor of the land exchange. I believe it would be beneficial and fair to all concerned."
- "The historical shoreline established when Lake Cushman was first filled to the 738' capacity should supersede the erroneous survey originally completed in the 1920's."
- "Please keep the lake up to its normal water level of 738 feet."
- "We strongly urge you to do anything possible to restore the Lake to its original level."
- "I have invested $60,000 in housing, docks, power, water, etc. Needless to say, if the lake is not filled, I have a $15,000 dock and deck complex that is high and dry."
- "It appears that the residents of Lake Cushman are the victims of another government fiasco."
- "Lake Cushman is a gem of a lake when full."
- "I do not believe that any exchange of property will or could possibly have any effect on the environment, also lowering of the Lake will in no way improve anything in the environment."

Twelve additional letters were written in favor of the land exchange by people who did not identify any affiliation. The people who wrote these letters gave many of the same reasons for supporting the land exchange as those identified at the public meetings. Their comments included:

- "Any environmental impact from construction of Cushman Dam #1 and the 738 ft. elevation of the reservoir was suffered more than 60 years ago and has long ago been accommodated by the affected flora, fauna, people, fish and the like."
- "I fully support the proposed land exchange as being an environmentally responsible action."
- "Many groups of citizens will suffer financially if the lake level is lowered."
- "This trade is a plus for everyone affected and should be accomplished as fast as possible."

Letters on the issue of lake level

Fifteen letters were written that dealt exclusively with the issue of lake level. Some of the letters document years of vacationing and living at Lake Cushman and the authors' fears that their lives will not be the same if the lake level were lowered. Comments from these letters included:

- "We feel that if the Lake is lowered, property owners should be reimbursed."
- "More damage is done to the fish and wildlife by raising and lowering the lake than by a constant higher level."
- "Do an old lady a favor. Get off our backs and leave the lake level up so that I can once again enjoy its beauty."
- "It is inconceivable that anyone would want to destroy such a beautiful spot."
- "I would seem that the environment, fish and animal habitat would be altered if Lake Cushman were kept down all year round."
- "If the water level is allowed to be lowered on a permanent basis, the appearance of the lake will be devastating and certainly will affect the value of all the property at the lake. It is hoped that the people that make the final decisions about the exchange of land and environmental assessment will use common sense."

Letters on other issues

Thirteen letters were written regarding issues other than those expressing support for the exchange or concern for the level of the lake. These comments included complaints about the long process and the disjointed efforts of various governmental agencies. Concerns were raised about Superintendent Maureen Finnerty's statements and position on the project, about the fact that no FERC representatives attended the public meetings, and the fact that quite a bit of money has been spent on the entire issue. One letter related the relative "good" behavior of residents versus the "unruly" behavior of some Park visitors. Others expressed concerns about the waste of salmon and the tangled nets left in the river by tribal members that seemed to contradict the official statements by their representatives. Another letter expressed dismay at the attitude of many non-Indian residents towards the tribe. Comments from these letters included:

- "I would like to suggest another impact statement be considered! We could refer to it as a financial impact statement which would include the ultimate cost of this charade to the taxpayers and the City of Tacoma rate payers."
- "If justice were to be served, I would tell the City of Tacoma to use the land as President Roosevelt declared and give the Park Service nothing."
- "It would be prudent to include a representative from FERC in these public meetings."
- "It is a sorry comment on human nature that so many of our Park visitors are irresponsible, unruly vandals."
- "We are even more troubled when we hear discussions among people at Lake Cushman who appear to be quick to judge and discount the views of our Native American neighbors. Some of the statements are blatantly racist and others are simply intolerant."
- "Prepare a full EIS on this significant action."
- "It is our opinion that because the lake was in existence before the Olympic National Park was formed, and because the area in question was flooded before the existence of the Park, the Park is out of line objecting to the flooding."

Appendix G

North Fork Skokomish River Fish Surveys

North Fork Skokomish River Fish Surveys
August 1992

Olympic National Park personnel surveyed spawning activity by char and salmon in the North Fork Skokomish River at Staircase in the fall of 1991. These surveys were initiated to document any spawning in the area proposed for exchange with the City of Tacoma as part of the Cushman dams relicensing. The area initially surveyed included only the area proposed for exchange (742 foot contour downstream to the park boundary). This area includes several riffle:run:pool complexes before reaching the 738 foot contour, which is the highest point seasonally inundated by the Cushman projects under the current operating regime. From the 738 foot contour downstream, the river's substrate changes significantly containing much higher amounts of sand and is much less suitable for spawning. Although this area is not inundated during the winter months when most bedload movement occurs, there apparently is enough deposition during the summer to greatly reduce the quality of the spawning substrate below the 738 foot contour. Only minor amounts of spawning occurred below the 738 foot contour line during the fall season.

An October 9 spot check indicated substantial numbers of bull trout (Salvelinus confluentus) had moved into the lower river and some spawning activity had begun. A survey on October 23 from the Staircase Bridge to the park boundary revealed large numbers of adult bull trout and spawning in progress. Because of the large number of char spawning in the area proposed for exchange, subsequent surveys included all accessible area (assuming bull trout do not ascend above Staircase Rapids) in an attempt to determine the percentage of the population that utilizes the area proposed for exchange. However, the next scheduled survey on November 4 was proceeded by a freshet and the river was too high and turbid for surveying on this date. When we returned to the river on November 15, the peak of spawning was passed as the number of live fish had declined greatly and many of the previously constructed redds were no longer visible. Since we were not able to survey the entire area during the peak of spawning, it was not possible to determine the percentage of the population spawning in the area proposed for exchange although it appears to be substantial. Additional surveys should be conducted in 1992 to determine the distribution of spawners in the North Fork Skokomish River.

In addition to bull trout, chinook salmon (Oncorhynchus tshawyscha) were observed spawning in the North Fork on November 15. These fish were apparently trapped when the dams were constructed. Six chinook were observed spawning in the area proposed for exchange. These fish were substantially larger than the bull trout, had different coloration, and spawned in larger substrate and higher velocities.

North Fork Skokomish River
Fish Surveys, 1991

Date	Area Surveyed	Bull Trout	Chinook Salmon	New Redds	Cumulative Redds
Oct. 9	Spot check	70	0	0	0
Oct. 23	Section #2	0	0	4	4
	Section #3	210	0	38	42
Nov. 4	River too high and turbid to survey.				
Nov. 15	Section #1	0	0	12	54
	Section #2	2	0	4	58
	Section #3	11	6	10	68
Dec. 12	Section #1	0	0	1	69
	Section #2	0	0	8	77
	Section #3	15	0	4	81

Section #1: Staircase Rapids to Staircase Bridge.
Section #2: Staircase Bridge to 742 foot contour.
Section #3: 742 foot contour to park boundary (area proposed for exchange).

☆ U.S. GOVERNMENT PRINTING OFFICE: 1992—604-527

END

6-9-94